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A TAXONOMIC STUDY OF THE LARVAE OF WEST AFRICAN SIMULIIDAE (DIPTERA: NEMATOCERA) WITH COMMENTS ON THE MORPHOLOGY OF THE LARVAL BLACK-FLY HEAD

R. W. CROSSKEY

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A TAXONOMIC STUDY OF THE LARVAE OF WEST AFRICAN SIMULIIDAE (DIPTERA: NEMATOCERA) WITH COMMENTS ON THE MORPHOLOGY OF THE LARVAL BLACK-FLY HEAD

By R. W. CROSSKEY[1]

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INTRODUCTION

The present study of the larvae of West African black-flies was begun in 1954 when I was engaged on a survey for Simuliidae in Northern Nigeria, mainly in connection with the distribution of *Simulium damnosum* Theo., the West African vector of onchocerciasis (Crosskey, 1956, 1957). It soon became clear that in the absence of any keys to Ethiopian black-fly larvae it was impossible reliably to identify larvae unless (*a*) they were associated with pupae of one species only, in which case it was reasonable to assume that larvae and pupae were conspecific, or (*b*) they showed a characteristic form of " gill-spot " in mature larvae which made their correlation with known pupae virtually certain. This difficulty fortunately did not apply to *S. damnosum*, whose characteristic larval features were already known, but larvae of other species could usually not be named at all, particularly if they were collected separately from pupae. On the other hand identification of pupae and adults was reasonably straightforward with the use of Freeman & de Meillon's (1953) monograph of Ethiopian Simuliidae ; although these authors have briefly alluded to some of the more evident larval characteristics they have not given detailed larval descriptions or keys, and the present contribution is in a sense supplementary to their work with the intention of bringing our knowledge of the larvae more into line with that of the other stages. In this paper I have described, and given a key to, the species of West Africa only (for definition of West Africa see below), and it is hoped to provide a further study of the species of the rest of the Ethiopian Region (i.e. Africa south of the Sahara) at a later date. I have however examined all larval material of Ethiopian Simuliidae in the B.M. collection, and have taken into consideration all published larval descriptions including those of species from Madagascar. In this way I have been able to draw up a key to the larvae of the species-groups for the Ethiopian Region as a whole, but it should be appreciated that the definitions of species-groups and the key may require modification as more becomes known (especially since the larvae of many central and southern African species are still unknown).

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The early instars of the larvae of almost all the Ethiopian Simuliidae are unknown and most collections contain only mature larvae or larvae of medium size which are probably in the third or fourth instar (assuming that there are normally six instars in larval Simuliidae, as has recently been well demonstrated by Terterjan (1957) in *Wilhelmia paraequina* (Puri)). It will doubtless be some years before all the instars of all species are collected and described, and at the present time taxonomy has perforce to be based on mature or almost mature (presumably VIth stage) larvae, and this must be borne in mind in using the keys and descriptions. Younger larvae normally differ very considerably from older larvae and attention has been drawn to these differences in another section below. In this paper I use the words " mature larva " in the accepted sense of a larva which has attained its greatest length and in which the histoblast of the pupal respiratory organ is developed, although according to Hinton (1958) the so-called fully mature larva is in reality a " pharate pupa " which has undergone the larval-pupal moult and which continues to masquerade as a larva within the last larval cuticle. But since the taxonomic characters reside in the cuticular structures evidenced by this last larval skin it is legitimate taxonomically to speak of the mature larva, albeit that the living animal invested by the non-ecdysed skin is already the pupa.

The larvae of several species of Ethiopian Simuliids have already been described, but many of the descriptions are very incomplete and until the present paper no larval keys have been published. The first references to larvae of Ethiopian blackflies are those of Roubaud (1907), who commented on the rectal gills of *S. damnosum*, and of King (1909), who gave somewhat imperfect coloured illustrations and a few lines of description of *S. damnosum* and *S. griseicolle* Becker ; the observations of these authors were repeated by Austen (1909). Further scattered, but more detailed, descriptions were given by Gibbins (1933, 1934, 1935, 1936, 1939). Gibbins' larval slides (in the B.M. collection) have been examined and there are several inaccuracies in his descriptions ; as Freeman & de Meillon (1953) have already remarked, Gibbins seems sometimes to have made his drawings from mounts of whole larvae, so that " differences " between species appear which do not in reality exist, especially in the case of the mandibles which are in fact often remarkably uniform. In some cases the number of rows and hooks per row in the posterior circlet seems to be exaggerated by Gibbins, and my own counts on his slide material do not agree, particularly in species with very numerous hooklets such as *S. dentulosum* Roubaud ; I have recorded these discrepancies where appropriate in the descriptions which follow. One of the most striking and easily seen differences between species, that of the postgenal cleft, was overlooked by Gibbins and he did not record this character in any of his larval descriptions. However, most of Gibbins' description is essentially sound, and difficulties of working in African conditions may be responsible for inaccuracies.

More recently the larvae of some further species have been described by Roubaud & Grenier (1943), Grenier & Doucet (1949*a*, 1949*b*), Grenier & Rageau (1949), Grenier & Ovazza (1951, 1956), Grenier, Hamon & Rickenbach (1955), and Grenier & Mouchet (1959) ; a few larval features have been noted by Freeman & de Meillon (1953), and Freeman (1955) has briefly described the larva of *S. berneri* Freeman, a remarkable species associated with mayfly nymphs and possibly belonging in the *S. copleyi* Gibbins complex. McMahon (1957) has noted some characteristics of the larvae of the *S. neavei* Roubaud complex and Lewis (1960) records certain differences in the hypostomium of species in this complex.

In other zoogeographical areas knowledge of black-fly larvae is, for some territories at least, more advanced than in the Ethiopian Region, and larval keys exist for : Alaska (Sommerman, 1953) ; Australasia (Tonnoir, 1925) ; Australia (Mackerras & Mackerras, 1948, 1949, 1950, 1952) ; Britain (Edwards, 1920 ; Puri, 1925 ; Smart, 1944) ; Central Asia (Rubtzov, 1951) ; France (Grenier, 1953) ; Guatemala (Dalmat, 1955) ; Java and Sumatra (Edwards, 1934) ; Mexico (Vargas, Palacios & Najera, 1946) ; New York State, U.S.A. (Johannsen, 1903 ; Stone & Jamnback, 1955) ; North-eastern States, U.S.A. (Johannsen, 1934) ; U.S.S.R. (Rubtzov, 1956).

DEFINITION OF WEST AFRICA AND LIST OF WEST AFRICAN SIMULIIDAE

In this paper I use the term West Africa in a geographer's sense (e.g. Harrison Church, 1957) to include that area lying to the west of the western boundary of the Cameroons Republic (former French Cameroons). Long usage has given West Africa this fairly precise meaning based upon its physical separateness from Equatorial and North Africa. The northern limit of West Africa is defined by the northern boundaries of the territories of French West Africa, but for all practical purposes by the Sahara. The western boundary of Cameroons Republic (the boundary between the former British and French Cameroons) lies along the watershed formed by the Cameroon-Adamawa Highlands (Adamawa Massif), which stretch with few breaks from the Gulf of Guinea to Lake Chad. This mountainous area is drained south-eastwards to the Sanaga River and Bight of Biafra, and north-westwards principally to the Benue-Niger system ; the narrow plain of the Benue River forms the only major break in the upland chain, which in places rises to 7,000 or 8,000 ft. with the southernmost outlier (Cameroons Mountain) reaching over 13,000 ft., the highest land in Africa west of the Ruwenzori range.

To what extent the natural divide provided by the Adamawa Highlands forms a zoogeographical barrier is problematical but its significance may have been underestimated. Zoogeographically the West African Sub-region of the Ethiopian Region is usually held to include West Africa as defined above together with Equatorial Africa and the Congo Basin, and it is true that there is often a general uniformity in the fauna of this sub-region as a whole ; nevertheless there are usually also species which are characteristic either of the Congo Basin or of Upper Guinea (that area to the west of the " Dahomey gap " where the savannah penetrates to the sea). The term West African Sub-region is scarcely apt for the composite area from Senegal to the Congo, and seems as inappropriate as the term Ethiopian Region itself ; similarly the term Guinea is very unsatisfactory since its meaning has always been vague, and since confusion may now arise with the Republic of Guinea. We really require a new, less ambiguous, name to denote the area at present called the West African Sub-region, and to restrict the term West Africa to that portion of the sub-region lying west of the " Cameroon corner " of the Gulf of Guinea. It seems to me that West African faunal works are best delimited by the Adamawa Highlands since this is a natural topographical entity which may very likely be of zoogeographical importance. If, on the other hand, Cameroons Republic is regarded as belonging in West Africa (as for example by French entomologists) it becomes inpossible to define West Africa in a logical way, for no topographical or zoogeographical barrier exists between Cameroons Republic on the one hand and Gabon, Middle Congo, and Oubangi on the other ; the faunistic associations of Cameroons seem to me to be much more definitely with Equatorial Africa and the Congo basin than with West Africa proper.

In view of the considerations given above I have omitted from this paper Simuliidae which are known from Cameroons Republic (former French Cameroons) but not from west of the Adamawa Highlands, e.g. *S. hissetteum* Gibbins (= *S. vargasi* Grenier & Rageau) and *S. ovazzae* Grenier & Mouchet. From West Africa as defined twenty-one species and twenty-eight pupal forms of Simuliidae are known, all of which are placed by Freeman & de Meillon in *Simulium* Latreille ; they are listed below in the species-groupings given by Freeman & de Meillon (1953). Full synonymy is given by these authors, and all specific names given in this paper are employed in the same sense as Freeman & de Meillon (op. cit.).

Division A

Group I. *Simulium alcocki* Pomeroy, 1922, type form
    form *occidentale* Freeman & de Meillon, 1953
    form *djallonense* Roubaud & Grenier, 1943
    form *coalitum* Pomeroy, 1922
Simulium johannae Wanson, 1947
Simulium schoutedeni Wanson, 1947
Simulium impukane de Meillon, 1936
Simulium kenyae de Meillon, 1940
Simulium mcmahoni de Meillon, 1940

Group II. *Simulium cervicornutum* Pomeroy, 1920, type form
Simulium unicornutum Pomeroy, 1920, type form
form *palmeri* Pomeroy, 1922
form *blacklocki* Edwards, in de Meillon, 1930
Group III. *Simulium ruficorne* Macquart, 1838
Simulium aureosimile Pomeroy, 1920
Group IV. *Simulium hirsutum* Pomeroy, 1922, type form
Simulium adersi Pomeroy, 1922
Simulium berneri Freeman, 1954

Division B

Group V. *Simulium griseicolle* Becker, 1903, type form
form *tridens* Freeman & de Meillon, 1953
Group VI. *Simulium dentulosum* Roubaud, 1915, type form
Simulium loutetense Grenier & Ovazza, 1951
Group VII. *Simulium medusaeforme* Pomeroy, 1920, type form
form *hargreavesi* Gibbins, 1934
Simulium vorax Pomeroy, 1922, type form
Simulium colas-belcouri Grenier & Ovazza, 1951
Simulium bovis de Meillon, 1930
Simulium damnosum Theobald, 1903

S. berneri Freeman, described after the publication of Freeman & de Meillon (1953), is placed here in the *hirsutum*-group because it appears to be most nearly allied to *S. copleyi* Gibbins and *S. lumbwanus* de Meillon, species which are also associated with mayfly nymphs and which Freeman & de Meillon place in Group IV. Whether the *copleyi* and *neavei* complexes can legitimately be placed in the same group as *hirsutum* and *adersi* seems, however, very problematical.

MATERIAL AND METHODS

Larvae of all the twenty-one West African species are known and have been examined. Those of fifteen species were personally collected in Northern Nigeria, and larvae of the remaining species have been studied from material in the B.M. collection or belonging to Dr. D. J. Lewis. In addition to the spirit material I have also examined the slides of larvae in the B.M. collection, including those made by the late E. G. Gibbins from which his larval descriptions were drawn up.

Correlation of larvae with known species has been established by: (*a*) collecting larvae with pupae of known species; (*b*) confirming identity by dissection of the pupal respiratory organ of mature larvae (many of the Ethiopian species having very characteristic pupal gills); and (*c*) by examination of male genitalia from pupae collected with larvae, particularly for confirmation of identity in cases where the pupae themselves might be confused.

Larvae collected personally and those in the B.M. collection are preserved in 80% alcohol and it should be noted that descriptions of colouring are based on this spirit material; long preservation in spirit changes the general colour and so far as possible the colour descriptions have been made from my own larval material recently collected. Larvae are undoubtedly best kept in spirit ; material kept in chloral gum seems most unsatisfactory since after such treatment the body shape may be distorted, the pigmentation and general colour difficult to make out, and the presence or absence of ventral papillae may become difficult to ascertain with certainty.

Certain characters are best seen in spirit material without mounting ; these include body shape, pigmentation and coloration, presence or absence of ventral papillae, form of the postgenal cleft, secondary lobules in the anal gills, and sometimes the cuticular ornamentation of scales or spines. Almost all other characters require slide mounts. Mounts of whole larvae have been found of very little value, and for the present study separate balsam mounts of the following larval structures have been made for each species (after the customary treatment with 10% KOH and clearance in cedar-wood oil) : head capsule (mounts of whole head capsule without appendages, ventral surface uppermost, in cavity slide), hypostomium, antennae, cephalic fans, mandibles, maxillae and hypopharynx and labrum, proleg, pupal respiratory histoblasts, abdominal cuticle, posterior circlet and anal sclerite. Staining is in general not required, and in this study a phase-contrast microscope was used for the examination of very small or unsclerotized structures, particularly for the fan-ray setae, the pecten of the lateral plate of the proleg, and the cuticular hairs (? microtrichia) and setae. Stained preparations (using 1% acid fuchsin in 20% alcohol) were however made of the rays of the cephalic fans.

In the descriptions I have, however, omitted mention of the setae on the inner surfaces of the cephalic fan-rays. These setae are generally very uniform in species which are closely similar, and only differ slightly from the usual picture in species which are otherwise very easily distinguished ; consequently they seem to have little or no taxonomic value for separating closely allied species, where one needs to find reliable characters. I have recorded the number of rows in the posterior circlet to which the posterior arm of the anal sclerite extends ; it will be noticed that this number is very different in different species, but it is of course a measure of the closeness of the rows in the circlet, and not of the length of the arm of the sclerite.

Segment length ratios for the antennal segments have been given in the descriptions, and for this purpose the third and fourth segments have been regarded as a single segment since the fourth (apical) segment is extremely small ; only three figures therefore appear in the ratios given.

Larval descriptions are based on mature larvae ; in species with more than one pupal form the larva is described from the type form, except in the case of *S. medusaeforme* form *hargreavesi* which is very common and abundant whereas the type form of *medusaeforme* is rare. As far as is known at present the larvae of different pupal forms are in any case indistinguishable from one another except on the respiratory organ, which is strictly a pupal character.

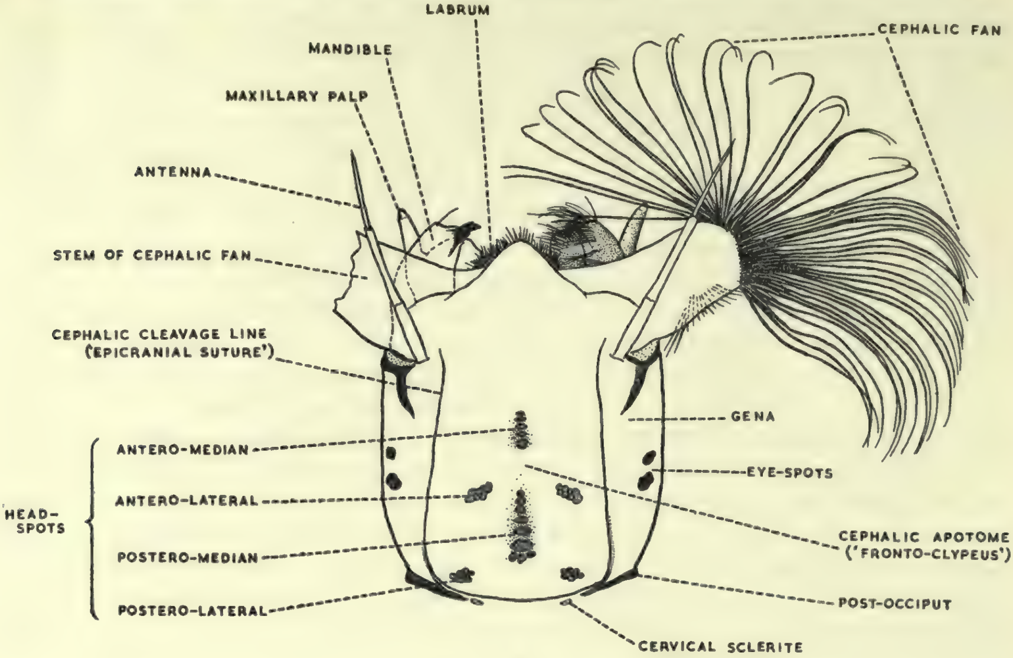
MORPHOLOGY OF THE SIMULIID HEAD CAPSULE

The need to apply in taxonomy a valid name to the strongly sclerotized antero-ventral region of the cranial wall has led me to consider in this section the general morphology of the larval black-fly head. Although the morphology of the head capsule of other groups of larval Nematocerous Diptera has been recently studied, e.g. in the Anisopodidae by Anthon (1943), in Ceratopogonidae by Lawson (1951), in Chironomidae by Cook (1944*a*) and Gouin (1959), in Culicidae by Cook (1944*b*) and Snodgrass (1959), and in Tipulidae by Chiswell (1955), there does not appear to be any published interpretation of this work in relation to the head of larval Simuliidae, although Grenier (1949) has made use of the term " hypostomium ". It is necessary to consider here briefly the morphology of the larval black-fly head, since in my view it is important that morphological names should be used as far as possible in taxonomic studies, and that taxonomic terms must be jettisoned if they conflict *badly* with the usage of morphologists.

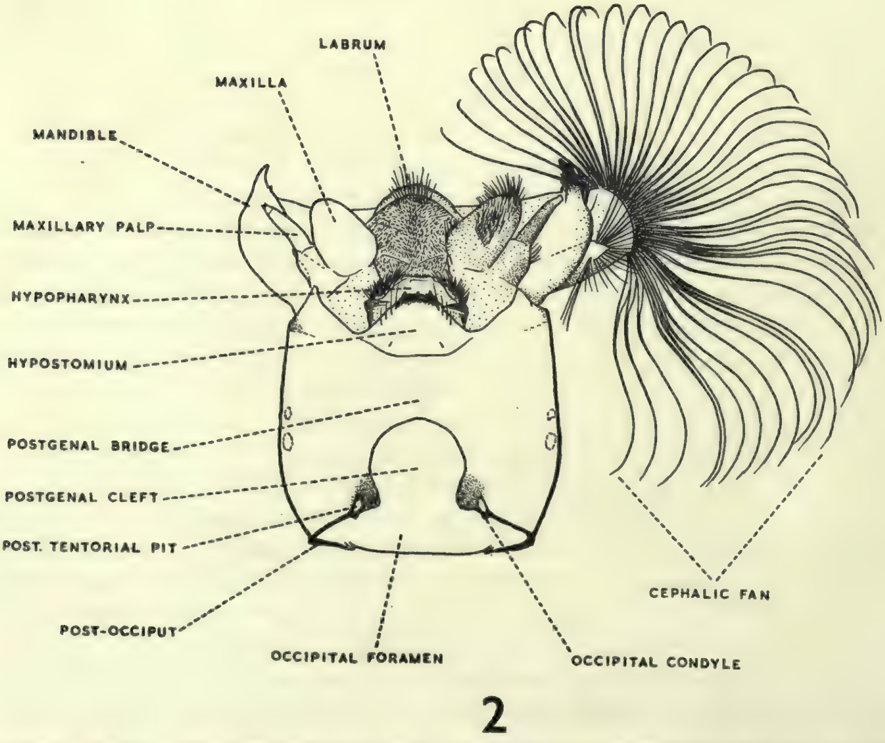
For many years the flattened and toothed antero-ventral projection of the head capsule has been termed the *mentum* or *submentum* (most authors follow Puri (1925) in using the latter name) and sometimes even the *labium*. It seems odd that this structure, so evidently a part of the cranial wall without articulation of any sort, should have been regarded as of labial (i.e. head-appendage) origin. Recently however the work of the authors cited above has established that the so-called submentum is in fact formed from the head capsule proper, and the name *hypostomium* has been given to this area (Anthon, 1943 ; Hennig, 1950 ; Lawson, 1951 ; Chiswell, 1955 ; and Snodgrass, 1959), and is followed in this paper. Gouin (1959) calls it the hypochilum in Chironomidae, but this seems an unnecessary departure from the accepted term hypostomium.

To appreciate the nature of the hypostomium requires some consideration of the whole ventral region of the head capsule (Text-fig. 2). The Simuliid larval head is prognathous, and the elongation of the head has required the " filling in " of the long area between the foramen magnum and the mouthparts. The foramen magnum is mainly bounded (not medio-dorsally or ventrally) by a distinct darkened band which is to be regarded as the post-occiput, delimited anteriorly by a slight groove or post-occipital sulcus (" post-occipital suture "). Ventro-laterally the post-occiput is developed into two small backwardly-directed processes which may be interpreted as occipital condyles. Anterior to each condyle is a small oval hollow which is generally surrounded by a strongly sclerotized area ; since these pits lie ventrally in the course of the post-occipital sulcus it seems legitimate to interpret them as posterior tentorial pits (occipital pits of Sommerman (1953)), although it should be noted that no tentorial endoskeleton is invaginated from them.

The sclerotized ventral surface of the head between the posterior tentorial pits and the labium is formed by the *postgenae*, which become greatly elongated in many insects with a prognathous head in order to form a sclerotized floor to the cranium. In some Nematocerous larvae (e.g. *Chironomus* and certain mosquitoes) the ventro-median union of the postgenae remains evident as a longitudinal line or median postgenal suture. In Simuliid larvae however there is no such line remaining to indicate the postgenal union, although a few species show a more weakly sclerotized longitudinal area behind the base of the hypostomium, and some (e.g. in the genus *Cnephia* End.) are even completely unsclerotized in the midline. The position in the Simuliid head is further complicated since the ventral cranial wall between the


LABRUM
MANDIBLE
MAXILLARY PALP
ANTENNA
STEM OF CEPHALIC FAN
CEPHALIC CLEAVAGE LINE ('EPICRANIAL SUTURE')
HEAD-SPOTS
ANTERO-MEDIAN
ANTERO-LATERAL
POSTERO-MEDIAN
POSTERO-LATERAL
CEPHALIC FAN
GENA
EYE-SPOTS
CEPHALIC APOTOME ('FRONTO-CLYPEUS')
POST-OCCIPUT
CERVICAL SCLERITE

1


LABRUM
MAXILLA
MANDIBLE
MAXILLARY PALP
HYPOPHARYNX
HYPOSTOMIUM
POSTGENAL BRIDGE
POSTGENAL CLEFT
POST. TENTORIAL PIT
POST-OCCIPUT
OCCIPITAL FORAMEN
OCCIPITAL CONDYLE
CEPHALIC FAN

2

Figs. 1 and 2. Head capsule and head appendages of mature (VIth stage) larva of *Simulium*; (1) dorsal; (2) ventral.

foramen magnum and the hypostomium is not always completely sclerotized—in fact only very few species (e.g. *S. berneri*, Text-fig. 39) have a completely sclerotized ventral surface to the head capsule. The vast majority of species have the posterior part of the ventral surface unsclerotized, so that the postgenae meet only in the anterior part, leaving a membranous opening behind, the *postgenal cleft* (Text-fig. 2).

This cleft (occipital cleft of Sommerman (1953), epicranial cleft of Stone & Jamnback (1955), ventral cleft of Rubtzov (1956) and French workers) occupies a position anterior to the posterior tentorial pits on the ventral surface and can hardly therefore be of occipital origin, nor can it be regarded merely as a forward ventral extension of the foramen magnum since the pits normally mark the ventro-lateral limits of the foramen. If the region of the cleft were sclerotized (as it is in fact occasionally) it would be " filled in " by the postgenae, and I have therefore described it as the postgenal cleft. The size and shape of the cleft are extremely variable (providing one of the most valuable taxonomic characters) but it does not as a rule extend forward as far as the hypostomium, leaving a sclerotic bridge between its anterior apex and the hypostomial groove which marks the base of the hypostomium. The area between cleft and hypostomium I have called for taxonomic purposes the *postgenal bridge* (Text-fig. 2). In some species of *Cnephia* however, as mentioned above, the postgenal cleft tapers forward to reach the hypostomium so that the postgenal bridge is incomplete medially ; a similar condition appears very rarely in *Simulium*, e.g. in *S. ibariense* Zivkovitch & Grenier.

The condition in these Simuliids is then not very dissimilar from that in the Tipulid larva in which the postgenae do not meet in the midline. The Tipulid hypostomium is clearly of paired origin, and according to Snodgrass (1959) is formed by the union of two processes extended forwards from the antero-median corners of the postgenae. Accepting Snodgrass' interpretation the hypostomium of Nematocerous larvae is postgenal in origin. In Chironomids the hypostomium shows no evidence of its dual origin, and there is also no line dividing it posteriorly from the postgenae proper. In Simuliid larvae however a transverse line is impressed on the cranial wall behind the hypostomium, so that the hypostomium appears to be a separate sclerotization from the postgenal bridge. This line is clearly secondary, but is valuable in taxonomy since it divides the hypostomium from the postgenal bridge and enables the relative lengths of the two areas to be compared ; for this purpose it may be termed the *hypostomial groove* (Text-figs. 2 and 4). Morphologically the hypostomium, being postgenal, is part of the postgenal bridge, but in the taxonomy of Simuliid larvae it is useful to distinguish the areas in front of and behind the hypostomial groove as the hypostomium and postgenal bridge respectively as in Text-fig. 2.

The whole composite sclerite forming the ventral and lateral walls of the cranium is sometimes termed the epicranial plate (e.g. by Stone & Jamnback (1955)), delimited from the fronto-clypeus which forms the dorsum of the head by the so-called frontal sutures (the arms of the Y-shaped epicranial suture). Snodgrass (1947, 1959) maintains that the frontal sutures have no morphological significance, that they are simply lines of weakness at which the head capsule ruptures during ecdysis, and that they do not define any specific part of the head ; he therefore calls the sutures *cephalic* *cleavage lines* and the sclerotic area between them the *cephalic apotome*, and I have followed these terms in this paper (Text-fig. 1). Ordinarily, as Snodgrass points out, the clypeus extends to the bases of the mandibles, and the frons is the facial area between the antennae and the eyes ; hence the cephalic apotome is not equivalent to the fronto-clypeus, so that it is perhaps best to drop this term from taxonomic use. In the early instars of Simuliid larvae the cephalic apotome does not form part of the postero-dorsal margin of the head, since the post-occiput and the occipital region of the head are produced from either side so that they almost meet in the midline, leaving only a narrow occipital cleft rather as in mosquito larvae (the stem of the Y of the " epicranial suture "). In successive instars the gap between the parts of the post-occiput on either side widens so that the cephalic apotome comes to provide a large part of the postero-dorsal margin of the head capsule—that is to say that the occipital cleft increases so much in width that it is no longer recognizable as a cleft. The lateral area of the head in front of the eye-spots is the gena.

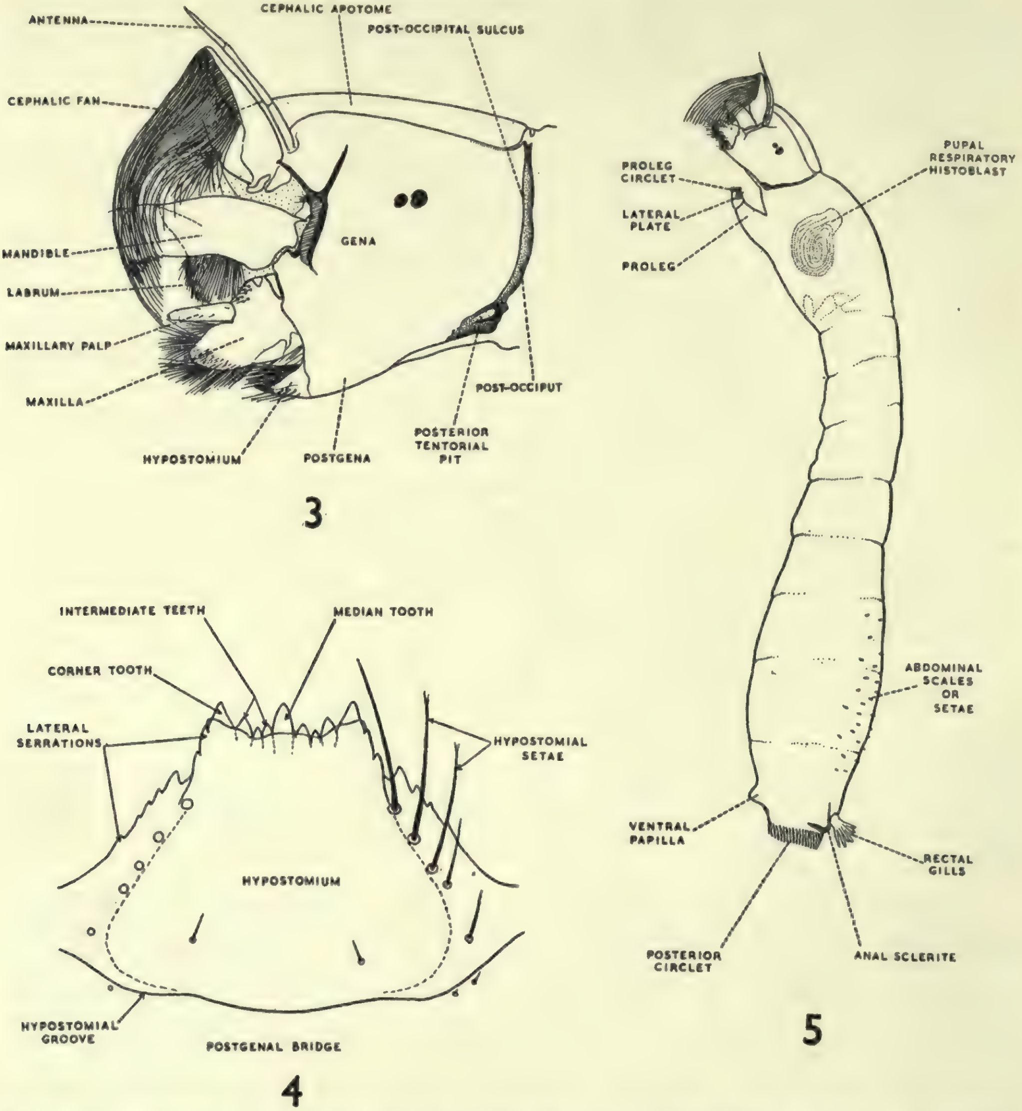
LARVAL CHARACTERS AND THEIR TAXONOMIC VALUE

The morphology of the Simuliid larva has been described in detail by Puri (1925), and useful brief accounts of larval characters are given by Smart (1944), Hennig (1950), Grenier (1953), Sommerman (1953), Stone & Jamnback (1955), and Rubtzov (1956). It will be useful however to record some comments on the characters of value in the taxonomy of larvae from the Ethiopian Region.

Body shape and cuticular ornamentation. Fully mature larvae of African black-flies vary from 4–11 mm. in length, but are usually fairly constant for any one species ; on average the larvae are much smaller than those of Holarctic species. There are two distinct body shapes, as has been noted in the case of Mexican and Guatemalan species by Vargas, Palacios & Najera (1946) and Dalmat (1955) ; in some the abdomen is slightly clubbed with the posterior segments clearly set off from the anterior segments and the sides of the thorax somewhat swollen (Text-figs. 7 and 11), and in others the abdomen (as seen in lateral view) expands gradually to its widest point and then contracts abruptly to the posterior circlet (Text-fig. 10) and the thorax is scarcely swollen laterally. The body form is constant within the species. Those with the clubbed abdomen normally show a pair of ventral papillae, downwardly-directed conical processes on the last abdominal segment just before the posterior circlet (Text-fig. 7), and those species with the gradually expanding form are without ventral papillae. The presence or absence of these papillae (ventral tubercles of some authors including Sommerman (1953) and Stone & Jamnback (1955)) appears to be of some fundamental taxonomic importance, and in any faunal area there is normally a fairly clear division of *Simulium s.l.* species according to their presence or absence. Their correlation with a definite body form is also striking, although there are exceptions, and some African species with a clubbed abdomen are without papillae, e.g. *S. griseicolle* and *S. bovis* (Text-fig. 6). The dorsal surface of the body is normally smooth in outline, but in one Ethiopian species (*S. damnosum*) the anterior abdominal segments are produced dorso-laterally into paired conical processes or tubercles (Text-fig. 9), of variable size but often very strongly prominent ; such protuberances seem to be very unusual, but Edwards (1934) has figured them in the larva of ? *S. varicorne* Edw. from Sumatra, and I have seen similar though smaller protuberances in the Palaearctic *S.* (*Titanopteryx*) *maculatum* Mg. The function of these tubercles and of the ventral papillae is difficult to surmise, but it is notable that the latter occur principally in slow-water species and are most frequently absent in species living in swiftly-flowing water.

The cuticle of most species bears well sclerotized setae, at least dorsally on the posterior abdominal segment. In some species setae also occur on the thoracic cuticle, but are normally absent from the proleg (*S. damnosum* is an exception to this). The large setae are socketed and presumably modified macrotrichia ; in some cases they are simple spine-like setae but are frequently flattened fan-shaped or spatulate scales (Text-figs. 136–154). The form of the setae is more or less constant for any particular species and extremely useful as a taxonomic character in Ethiopian forms, although it does not seem to have been used in the taxonomy of black-flies from other zoogeographical regions. Most species show only one type of scale or seta, but in one species (*S. griseicolle*) both simple setae and fan-shaped scales occur together. In a few species the cuticle is apparently bare, but careful examination always seems to show the presence of some small socketed hairs on the swollen areas of the abdomen between the anterior and posterior arms of the anal sclerite (the " expansions latero-dorsales " of Grenier (1949)). In addition to socketed setae (macrotrichia) the cuticle may show minute colourless hairs ; these seem to be almost impossible to see after potash treatment but may be seen in spirit material by transmitted light with the larva lying laterally. These exceedingly minute unsclerotized hairs appear to be filamentous extensions of the cuticle, without alveoli, and are therefore microtrichia as defined by Imms (1957) ; their occurrence may be fairly general, but they are certainly present in the *cervicornutum*-group and in *S. dentulosum* which otherwise appears to have a bare cuticle. The setae in Simuliid larvae are generally scattered, haphazardly arranged and without definite chaetotaxal arrangement.

Pigmentation and colour. Although the head capsule is sometimes pale and unpigmented most species show a definite head pattern and pigmentation. The markings of the head are formed by groups of head-spots (Text-fig. 1) which occur where the muscles are attached to the cranial wall. There are often more or less evident four groups of spots which may be termed antero- and postero-median, and antero- and postero-lateral head-spots. In some species the spots themselves are pale but the areas around them are darkened (e.g. Text-figs. 16–18), and in other species the spots are dark and the surrounding areas pale (e.g. Text-fig. 23) ; Edwards (1934) and Hennig (1950) have appropriately called these " negative " and " positive " head markings respectively, and these terms are followed in this paper. Although some species show an indefinite pattern, either with an unpigmented head or with the head capsule strongly and rather evenly infuscated, it is usually possible to discern into which category they fall ; negative pattern species may show very faint traces of an H-shaped pigmentation dorsally and a 3-shaped pigmented area laterally behind the eye-spots (essentially like Text-fig. 21), and positive pattern species may show the dark head-spots just a little more boldly than the surrounding dark pigmentation. Despite the variability in the intensity of pigmentation, the


ANTENNA
CEPHALIC APOTOME
POST-OCCIPITAL SULCUS
CEPHALIC FAN
GENA
MANDIBLE
LABRUM
MAXILLARY PALP
MAXILLA
POST-OCCIPUT
HYPOSTOMIUM
POSTGENA
POSTERIOR TENTORIAL PIT
3
INTERMEDIATE TEETH
MEDIAN TOOTH
CORNER TOOTH
LATERAL SERRATIONS
HYPOSTOMIAL SETAE
HYPOSTOMIUM
HYPOSTOMIAL GROOVE
POSTGENAL BRIDGE
4
PROLEG CIRCLET
LATERAL PLATE
PROLEG
PUPAL RESPIRATORY HISTOBLAST
ABDOMINAL SCALES OR SETAE
VENTRAL PAPILLA
RECTAL GILLS
POSTERIOR CIRCLET
ANAL SCLERITE
5

FIGS. 3–5. Mature (VIth stage) larva of *Simulium*: (3) lateral view of head; (4) ventral view of hypostomium; (5) left lateral view of larva.

general head pattern is extremely valuable taxonomically, and is normally constant for a particular species-group (Freeman & de Meillon (1953) suggested that head colour as a character is not applicable to Ethiopian species, but I have found this to be far from true). Pigmentation also varies in intensity in the antennae and in the lateral plates of the proleg, though this is not of much significance; generally speaking these structures are pale and unpigmented in the smaller species, but darkened in the larger species, especially on the basal segment of the antenna. In the known Ethiopian species of *Cnephia* the antennae are strongly pigmented on the apical halves with a pale ring between second and third segments.

The general colour of the larval body is pale, milky-white (rather translucent in living material) but shows a variable amount of darker coloration which is determined by chromatocytes visible through the cuticle ; the chromatocytes are large polygonal cells containing pigment granules which form a peripheral epithelium below the basement membrane (Hinton, 1959). The chromatocytes are closely aggregated dorsally but are fewer ventrally, where instead of lying adjacent to one another they are connected by cytoplasmic threads ; hence the colour of the larva is normally darker above, and pale below. On the abdomen the chromatocytes are occasionally less numerous intersegmentally, giving the larva an appearance of dark segmental mottling ; they are normally absent from the abdomen ventro-apically so that this region is distinctly pale. The pigment granules within the cell-layer formed by the chromatocytes impart to the larva, since the cuticle and epidermis are transparent, a general colour which varies from pale yellowish or greenish or grey to dark brown or nearly black ; generally speaking the colour is fairly constant in any one species, although some species do vary considerably. Chromatocytes also invest much of the nervous system and render the ventral nerve-cord very evident in certain species—e.g. the dark grey nerve-cord of *S. medusaeforme*. In the thoracic region the pattern of the chromatocytes varies considerably with larval development, so that whereas in younger larvae the peripheral layer covers much of the thorax in older larvae the chromatocytes withdraw from the developing histoblasts of the wings, legs and pupal respiratory organ. The histoblasts therefore form milky-white islands in the general thoracic colour which increase in size as the larva matures. The pupal respiratory histoblast becomes dark brown with maturity of the larva.

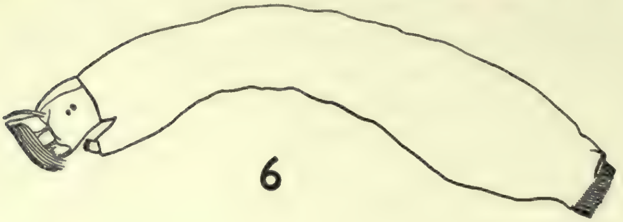
Head. The shape of the head capsule is generally very constant, but is sometimes unusually elongate as in *S. neavei* complex species and rarely strongly arched and contracted posteriorly as in *S. copleyi*. The eye-spots are of much the same size in most species, but in the *S. neavei* and *S. copleyi* complexes they are very small and also appear to be reduced in Ethiopian *Cnephia*. Otherwise they have no taxonomic value. The labrum has been mounted and examined in each species but seems to be very uniform and I have found no significant differences. The form of the cephalic apotome varies slightly, in some species being more or less parallel-sided and in others contracted anteriorly, but hardly provides a workable character. On the other hand the form of the postgenal cleft (Text-figs. 28–47) is very varied but provides one of the most valuable taxonomic characters since the shape is more or less constant for any species ; furthermore the shape appears to be the same in each instar. In some cases the cleft is enormous and occupies most of the ventral aspect of the head with the postgenal bridge very reduced, but in other cases the cleft is small and the postgenal bridge long (see Dorier (1945)). Rarely the cleft is absent. The form of the hypostomium is the most time-honoured larval character, but it has to be admitted that in many of the Ethiopian species it is remarkably similar and sometimes virtually indistinguishable, as in species of the *alcocki*-group (Text-figs. 48–52) ; nevertheless there are many species or species-groups in which its form is characteristic, and in order to record hypostomial characters in the descriptions I have used the names shown in Text-fig. 4. In almost all African species there is an apical row of nine teeth (13 in *neavei*-complex and 13–15 in known *Cnephia* species) in which the teeth at the antero-lateral angles and the tooth in the centre of the row are the most prominent (i.e. the median and corner teeth) ; between the median and corner tooth of each side are three intermediate teeth which are subequal in size or in which the middle one is smaller than the others. In some groups all the apical teeth are short and blunt with the median tooth only very slightly more prominent than the others and the corner teeth very broad basally. Lying laterally behind each corner tooth are two blunt dark strongly sclerotized teeth lying in the plane of the apical teeth, and behind these in a slightly different plane the lateral margin of the hypostomium is usually produced into a series of lightly sclerotized blunt or sharp serrations ; for descriptive purposes I have referred to all this series of denticulations as " lateral serrations ", although it should be appreciated that the anterior two on either side are separately sclerotized from the rest of the series and are more closely associated with the apical teeth. It appears that the two outer pairs of the thirteen apical teeth in the *neavei*-complex are derived from these first two serrations which have been produced forwards to lie in a row with the other teeth. The number of serrations is variable but their form, whether blunt or sharp, is fairly constant in any species. The hypostomium bears ventrally on either side a row of hypostomial setae (epicranial setae of Stone & Jamnback (1955)) which are frequently frayed apically ; the number of these setae varies slightly in each species, but some have more than others. Usually there are about 4–7 in each row, but often more, and *S. dentulosum* may have up to 18 setae on either side ; the number each side is not always the same. The number of setae and their position relative to the lateral margin of the hypostomium are of taxonomic use ; in some species the setae lie more or less parallel to the hypostomial margin, but in others distinctly diverge from the margin posteriorly. In the latter case the hypostomium is relatively shorter and broader than in those with the setae and margin more or less parallel. The distance between the apex of the corner tooth and the base of the first hypostomial seta is variable, and this distance varies from about half of, to more or less the same as, that between the apices of the corner teeth. In addition to the rows of large setae the hypostomium also bears ventrally some small basal discal setae, often one each side (as in Text-fig. 66), but the number and arrangement is variable and they have no taxonomic value.

The *antennae* are 4-segmented, but the apical segment is a minute elongate cone, and for practical purposes I have regarded it as part of the third segment so that in the segment length ratios given in the descriptions the third figure represents the third and fourth segments combined. Segment length ratios vary between species, but also vary very greatly according to the age of larvae, so that different species must be compared in the same instar. The length of the first segment relative to its breadth may be useful taxonomically. The paired apical papillae on the second segment are of no value and are very uniform.

The *cephalic fans* (premandibles, mouthbrushes) are of limited taxonomic use. The number of rays varies somewhat in mature larvae, and also increases with each instar during development. The mean number of rays in mature larvae does, however, differ between species and some clearly have more than others—especially the swift-water species in which there may be as many as 60 or 70 rays. Closely allied species, in which one needs to find characters, usually have much the same number. The small secondary fan is not much help with Ethiopian species, although Sommerman (1953) has used it generically for the Alaskan fauna. The setae borne on the inner margins of the rays of the main fan have been examined with a phase-contrast microscope in each species, in case they might provide characters of use in separating closely similar species; unfortunately they appear to be of little taxonomic use. There is some variability in the pattern of the setae but they are more or less identical in closely allied species, and are only distinctive in species which are easily enough identified on less obscure characters—e.g. *S. dentulosum* and *S. damnosum*. The setae are always clearly of two types, long and strong setae which are socketed macrotrichia with shorter and finer setae between; the smaller setae appear to be without alveoli and are probably microtrichia. The macrotrichia are generally spaced at about a ray's width from each other, but the spacing varies according to the position on the ray and to the position of the ray within the fan.

The *mandibles* have considerable taxonomic value, especially generically, in the Simuliidae of some parts of the world, but their usefulness among Ethiopian black-flies is somewhat restricted. Certain species-groups show particular characteristics in the mandibular teeth, and occasional species have some unusual character, but in many cases the mandibles are extremely uniform, as for instance in the *alcocki* and *cervicornutum*-groups. The shape of the mandible is very constant, but in some species the outer margin is more strongly arched than usual and the basal area of the apical teeth may be very broad; the length of the apical teeth also varies slightly. The comb-like series of teeth borne on the inner side varies in different groups (cf. Text-figs. 112 and 113), and rarely they are very reduced as in *S. berneri* (Text-fig. 114); normally they either form a rather even row gradually decreasing in size, or the first three are differentiated as stout comb-teeth from the remaining more slender rather bristle-like teeth. In the latter case these first three teeth, which are referred to as comb-teeth in the descriptions, usually vary themselves in size, with the first (apical) one much larger than the others and the second shorter than the first and third; occasionally the first three comb-teeth are subequal. In addition to bearing the comb-teeth the inner edge of the mandible is produced into denticulations which I have called mandibular serrations. In almost all Ethiopian species the serrations are paired (Text-figs. 112 and 113, *M.s.*) with the posterior serration much smaller than the anterior. The form of the serrations has some use taxonomically; the form of the anterior serration is sometimes very elongated, and the posterior serration is absent in *S. griseicolle*. In one Ethiopian species of *Cnephia* there is a series of saw-like serrations as in the Holarctic species of *Prosimulium*. Unfortunately the serrations are usually identical in very closely allied species.

The *maxillae* are very uniform except for the single-segmented maxillary palp which varies in length; the length of the palp relative to its width at the base (when seen laterally in the flattest position of the maxilla) has been noted in the descriptions. The apical processes of the palp vary somewhat in length, and seem



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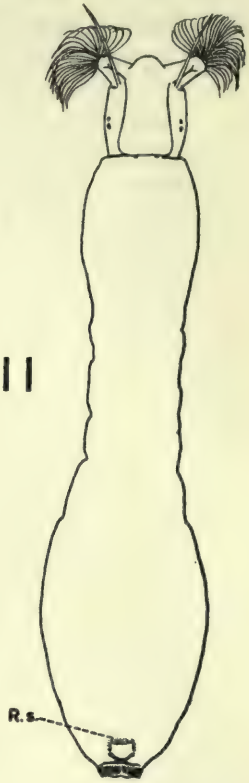

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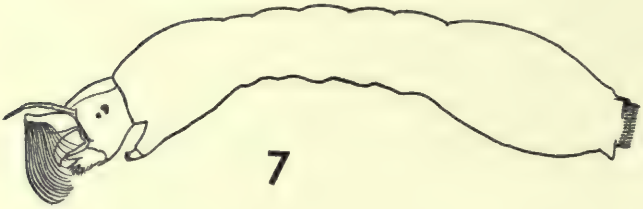

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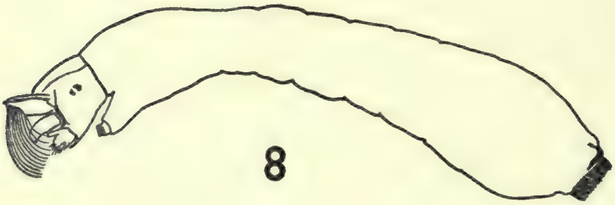

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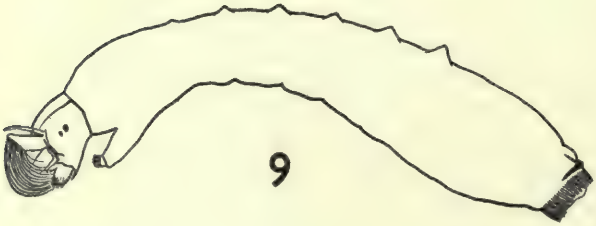

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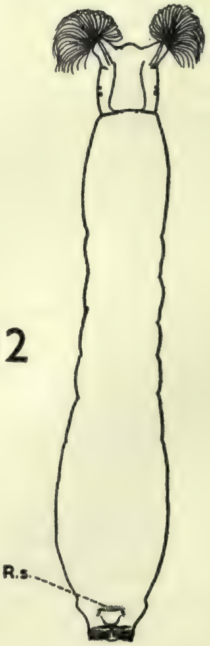

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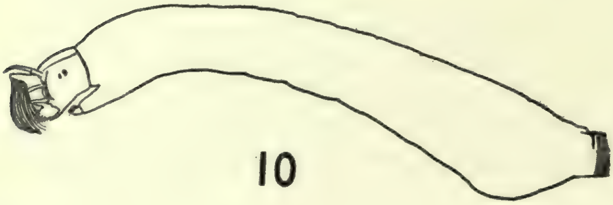

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to be shortest in swift-water species. The hypopharynx and labium (very well figured by Grenier (1949 : 219)) have been examined in each species studied but seem to be very uniform and without taxonomic characters, although it is possible that very detailed study of these structures might show differences in the sensillae of the prementum.

Thorax. Grenier (1949 : 191) has figured the structure of the ventral proleg. The proleg bears a pair of dorso-lateral lightly sclerotized plates on the apical segment, each of which carries distally a pecten of lightly sclerotized strongly tapering processes ; the approximate number of the processes has been given in the descriptions, but they are difficult to count and are of very limited usefulness as a character. They are most numerous in species with many hooks in the circlets, especially in *Cnephia* species ; sometimes the processes are simple and subequal in size, but often they are more or less subdivided at the base so that each strong process is associated with one or two very small secondary processes. The apical crown of hooks, the proleg circlet, shows a variable number of radial rows of hooks, and the number of hooks per row is also variable. The proleg hooks are difficult to count and not of much use for identification ; Sommerman (1953) however has found that the shape of the lateral plate is helpful in the case of Alaskan *Prosimulium.*

The pupal respiratory organ, on each side of the prothorax in mature larvae, can be dissected out for examination and is often extremely useful in identifying Ethiopian species, many of which have very characteristic pupal gills easily recognizable in the gill-spot of the larvae ; larvae belonging to different pupal forms of the same species may in some cases be recognized simply by external examination. The respiratory histoblast is not, however, very helpful in the case of species having pupal gills of the simple filamentous type—in dissecting out the gill-spot the filaments very easily break and in their tightly coiled condition are very difficult to count. The general outline of the gill-spot and the direction assumed by the branches or filaments are more or less constant in each species (Text-figs. 173–194).

Abdomen. Apart from the presence or absence of ventral papillae (Text-fig. 5), and the setae of the cuticle, the abdomen shows few very useful taxonomic characters. In a few Ethiopian species there is a characteristic pair of small lateral sclerites on the last segment just before the circlet (Text-fig. 155, *A.c.*) ; sometimes these accessory sclerites are represented by two or three very small slightly separated sclerotizations, or as a series of very small pale plaques lying in a dorso-ventral line. Similar sclerites occur in certain Australian species such as *S. torresianum* Mackerras & Mackerras and *S. aureonigrum* Mackerras & Mackerras but in none of the known Ethiopian species is there a complete sclerotized band running ventrally round the last abdominal segment and connecting the lateral accessory sclerites as occurs in some *Austrosimulium* species, particularly *A. mirabile* Mackerras & Mackerras and to a lesser extent in *A. fulvicorne* Mackerras & Mackerras, although traces of ring-like sclerotization occur in *S. buckleyi* de Meillon.

FIGS. 6–12. Larval body-shape in : (6) *S. bovis* ; (7 and 11) species of Division A with ventral papilla present ; (8 and 12) *S. medusaeforme* ; (9) *S. damnosum* ; (10) *S. vorax*. *R.s.* = rectal scales.

The presence or absence of rectal scales (peri-anal scales) on the dorsal wall of the rectum just before the anal opening is not very helpful with Ethiopian species, although this character has been used as the first segregate in Dalmat's (1955) key to *Simulium s. str.* of Guatemala ; these scales are present and very numerous in all Ethiopian species I have examined except *S. damnosum* and the *neavei*-group, in which they appear to be either totally wanting or reduced to the minutest vestiges. The function of these scales is presumably to clean the rectal gills which are retractile projections from the ventral floor of the rectum (Headlee, 1906), protrusible through the anal opening ; it seems curious that they should be absent in a species with very numerous secondary lobules in the gills. The scales are well figured in Puri (1925) and Grenier (1949).

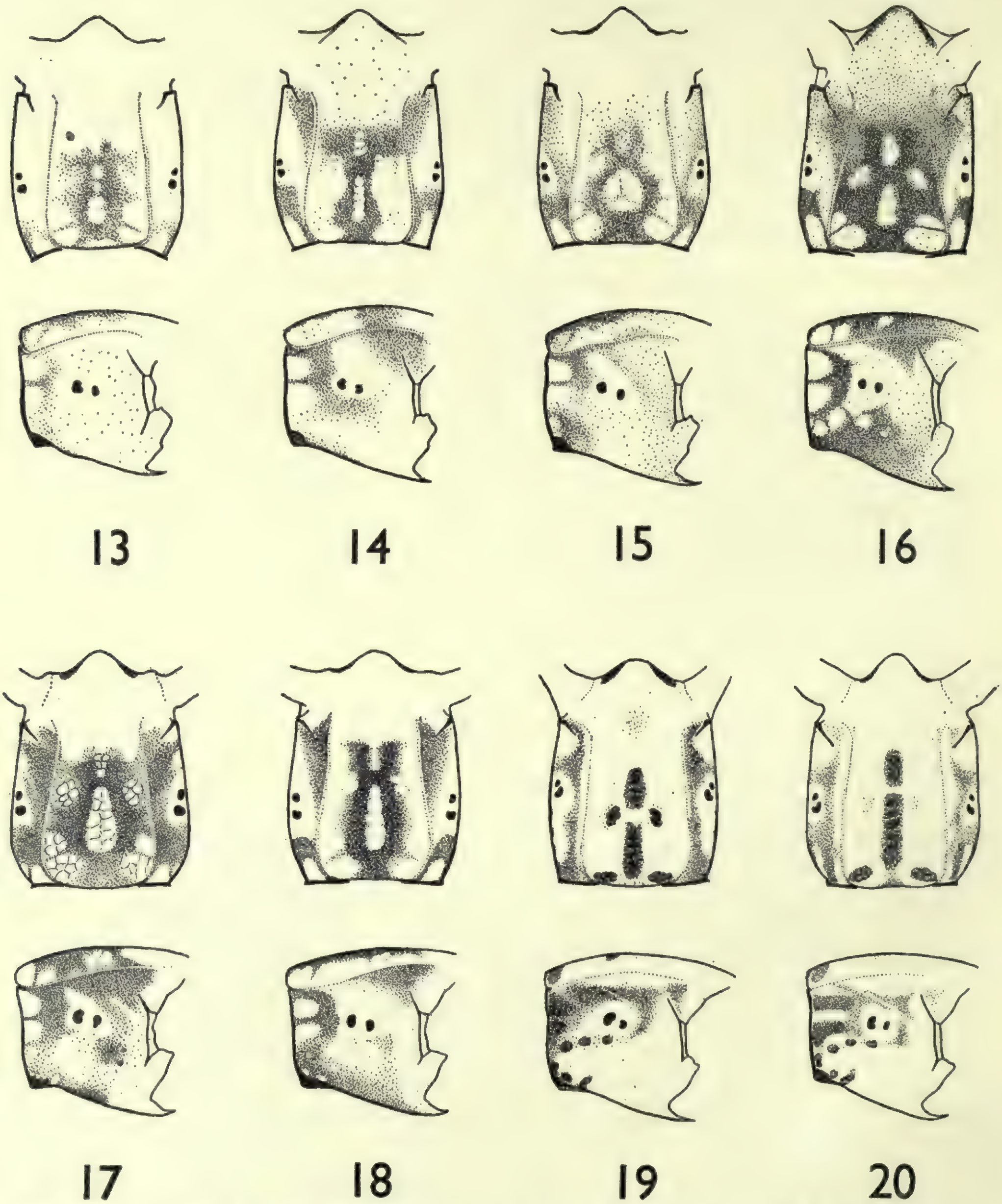
The form of the rectal gills is also of little value as a taxonomic character in Ethiopian species, except in so far as the gills have three simple lobes in *Cnephia* but are normally subdivided into numerous accessory thumb-like or finger-like lobules in *Simulium*. Most *Simulium* species have numerous secondary lobules (as in Text-fig. 171), but rarely each of the three lobes is simple (Text-fig. 172) or has only one or two small accessory lobules (Text-fig. 170) ; the number of lobules increases in successive instars, but even in the mature larva the number normally varies considerably although some (mainly fast-water) species clearly have more than others. In the most variable species (e.g. *S. ruficorne*) some mature larvae may have the gills simple, others may have one or two extra lobes, and yet other larvae may show several digitate lobules.

The anal sclerite (anal armature of Puri (1925), Hora (1927), and Gibbins in various papers) is always strongly sclerotized and in all Ethiopian species is the usual X shape. Some authors (e.g. Stone & Jamnback (1955)) refer to it as the X-shaped sclerite, which is descriptive in a sense, but as Grenier (1949) says is inexact since the anterior arms lie in a horizontal plane but the posterior arms lie more or less at right-angles to them in a vertical plane. The anal sclerite is very uniform in the Ethiopian species except for those forms living in phoretic association with mayfly nymphs or crabs ; in this group, perhaps as an adaptation to attachment on other Arthropods, the anal sclerite occupies a distinctly dorso-apical position instead of the usual dorsal position and the posterior circlet is more or less shifted downwards and forwards into a ventro-apical instead of a purely apical position ; furthermore the arms of the sclerite are very attenuate. In other species there is sometimes a slight median posterior projection (e.g. Text-fig. 168), but no African species have the small backwardly-directed spur from each anterior arm as in the *Austrosimulium* species. The shape of the sclerite is apparently useful taxonomically in the Australian species and has been figured by Mackerras & Mackerras (1948–52) in their larval descriptions, but in general it is not of much value with the Ethiopian fauna.

The posterior circlet, or posterior crochet ring of Sommerman (1953), normally occupies a distinctly apical position on the abdomen, but in species of the *neavei* and *copleyi*-complexes it tends to lie more obliquely than usual in a ventro-apical position. The number of rows of hooklets and the number of hooks per row differs between species. Some species clearly have very numerous hooks and rows, while in others there are obviously fewer (cf. Text-figs. 155–157 and 158–160); these differences provide useful characters, but the individual variability has to be borne in mind, and it may be noted that the rows and the hooks per row increase with the age of the larva from instar to instar. The number of hooks in a row is usually fairly easy to count, but the number of rows is more difficult; the rows can most easily be counted by cutting through the circlet ventrally and flattening out either side. It is worth noting that Grenier (1949) has established that the posterior circlet is morphologically a pseudopod comparable to the anterior pseudopod (proleg); the term "posterior sucker", used for instance by Gibbins in his descriptions, is of course quite inappropriate.

NOTE ON THE LARVAL INSTARS

Simuliidae are usually said to have six larval instars, and Terterjan (1957) has confirmed this in *Wilhelmia paraequina* (Puri), principally by measurements of the head capsule during larval growth; Terterjan's findings probably hold generally for the family. Most larval structures undergo considerable modification during larval life, so that descriptions and keys based on last stage larvae are not of much help as a rule in identifying the younger stages; furthermore it is usually difficult if not impossible to be certain in which instar a larva may be, though Terterjan's work, if generally applicable, helps considerably with this point. The first instar is always easily recognizable by the presence of the egg-burster on the dorsum of the head and by the simple shaft-like, apparently single-segmented antenna (the antenna is in fact 2-segmented but the apical segment is minute). The second instar has a 3-segmented antenna, and the normal 4-segmented condition is reached in the third instar. Subsequently the proportions of the antennal segments undergo alteration so that the segment length ratios are very different in the fourth to sixth instars. The number of rays in the cephalic fan, the number of hypostomial setae, and the number of hooks in the proleg and posterior circlets also increase greatly as the larva grows; the rectal gills have a simple trilobed form in the very young larva but increase in complexity in successive instars so that mature larvae of *Simulium* species (not always in other genera) usually have many secondary digitations. Other characters also become modified with increasing age, including the form of the hypostomium and mandibles; in fact very few characters remain similar throughout larval life. It does seem however that the shape of the postgenal cleft remains fairly constant, although its size naturally increases with the growth of the larval head capsule. The form of the capsule itself also undergoes minor modification, particularly in the shape of the cephalic apotome which comes to occupy more of the posterodorsal margin of the head because the ends of the post-occipital collar converge less closely in successive instars. The pair of small cervical sclerites (Text-fig. 1) becomes more or less differentiated in the fourth instar, but remains closely associated with the ends of the post-occiput until the last stage. In the thorax the pale imaginal discs of the legs, wings, halteres and of the pupal respiratory organ become evident in the fourth stage larva as six small round spots on either side; the size of these buds increases gradually until pupation, but only the histoblast of the pupal respiratory organ becomes darkened. The areas of the imaginal buds are not covered by



FIGS. 13–20. Head pattern and pigmentation of (13) *S. johannae* ; (14) *S. impukane* ; (15) *S. mcmahoni* ; (16) *S. kenyae* ; (17) *S. cervicornutum* ; (18) *S. unicornutum* ; (19) *S. aureosimile* ; (20) *S. ruficorne.*

chromatocytes, and larvae showing no traces of the buds are probably younger than the fourth instar.

LARVAL CLASSIFICATION AND KEY TO SPECIES-GROUPS OF ETHIOPIAN SIMULIIDAE

Freeman & de Meillon (1953) have provided a sound classification of the Ethiopian Simuliidae based on adult and pupal characters. They accept only two genera in the Ethiopian fauna, *Simulium* Latreille and *Cnephia* Enderlein; the latter genus is represented only by half a dozen species confined to South-West and South Africa, and the vast majority of species belong in *Simulium* in the broad sense. The Ethiopian *Simulium* fall into two more or less distinct categories, referred to by Freeman & de Meillon as Divisions A and B, each division with a number of species-groups based on male genital characters or on the structure of the pupal respiratory organ. Some of these groups are clearly equivalent to the genera accepted by workers elsewhere, e.g. Rubtzov (1956); the *medusaeforme* and *ruficorne* groups for example correspond to the genera *Wilhelmia* Enderlein and *Eusimulium* Roubaud respectively.

In general the present study of the larvae strongly supports Freeman & de Meillon's classification, and most of their groups are reasonably distinctive in the larval stage. It is not however easy to find an unexceptional larval character which distinguishes Ethiopian *Cnephia* from *Simulium*; the character of body-shape mentioned by Freeman & de Meillon (op. cit., p. 32) does not hold, since *S. vorax* Pomeroy and many other Division B species have a similar shape. The best character seems to be the hypostomium, which in Ethiopian *Cnephia* is closely similar to that in the Holarctic *Prosimulium* Roubaud and quite different from that in the Palaearctic species of *Cnephia* such as are figured by Rubtzov (1956). In *Cnephia* the rectal gills are simply trilobed and the cuticle without scales or setae, but in *Simulium* the gills (although normally with many secondary lobules) are also very occasionally without secondary lobules and the cuticle of many species is also bare. The mandibles may be more dependable; in *Cnephia* there are at least traces of three mandibular serrations and in *C. muspratti* Freeman & de Meillon there is a whole series as in *Prosimulium*. In *Simulium*, on the other hand, there are almost always two serrations (rarely only one), but the larva of *Simulium gyas* de Meillon (described by Grenier & Doucet (1949*b*) as *Simulium* sp. M_6) from Madagascar shows three mandibular serrations; the larva of another species from Madagascar, probably belonging in the *ruficorne*-group and described by Grenier & Doucet (1949*a*) as *Simulium* sp. M_3, also shows three serrations. The postgenal cleft of the southern African *Cnephia* is very small, rather as in *Prosimulium*, without the long cleft which extends to the hypostomium in some of the Palaearctic *Cnephia* (but by no means all of them). In the material seen of *Cnephia* larvae from southern Africa the number of processes carried apically on the lateral plates of the proleg is very high, and far more than in any Ethiopian *Simulium* known to me; the apical half of the antenna is also very strongly pigmented (except for a very distinct intersegmental ring between second and third segments). With limited material it is difficult to be sure how valuable these differences might be.

Freeman & de Meillon (1953) regard several Ethiopian species of *Simulium* as being represented by two or more distinct pupal forms. It is possible that these pupal forms are in reality complexes of very closely allied species, but in the main the characters of the larvae (so far as they are known) belonging to different pupal forms are identical—except of course in the respiratory organ of the pupa as represented in the last stage larva. The larvae provide no evidence that the pupal forms are anything more than this. The only possible exception to this known is *S. pauliani* Grenier & Doucet, which Freeman & de Meillon regard as a form of *S. unicornutum* Pomeroy, but the larva of *pauliani* as described by Grenier & Doucet (1949*b*) has branched fan-like scales instead of the large obvious spatulate scales on the abdomen of *unicornutum* ; as the form of cuticular ornamentation is normally very constant in any species it seems possible that *pauliani* is a distinct, though very closely related, species.

Very large flattened scales on the abdomen also occur in *S. schoutedeni* Wanson and *S. mcmahoni* de Meillon, and this feature combined with other larval characters such as the large postgenal cleft and sometimes the presence of lateral abdominal accessory sclerites, suggests that these two species are closely allied to *S. unicornutum* and *S. cervicornutum* and belong in the *cervicornutum*-group, although Freeman & de Meillon (1953) have—on the basis of their filamentous pupal respiratory organ—placed them in Group I, the *alcocki*-group. When the male genitalia are considered another resemblance is evident ; the ventral plate in *schoutedeni*, *mcmahoni*, *cervicornutum*, *unicornutum* and *aureliani* Fain, is distinctly indented each side, as though " pinched in " laterally.

In the larva of *S. alcocki* Pom. and in closely related species in the *alcocki*-group, *S. johannae* Wanson, *S. tentaculum* Gibbins, and *S. impukane* de Meillon, the abdominal cuticle bears small branched rather fan-like setae, and the ventral plate in the male genitalia (although varying in shape) has little or no trace of a lateral hollowing-out or notch. Unfortunately the different types of setae in the larvae combined with the different ventral plates in the male genitalia does not provide a hard and fast difference between the *alcocki*-group and the *cervicornutum*-group ; the inevitable intermediates exist. In *Simulium kenyae* de Meillon there is a very distinctly " pinched in " ventral plate but the larval abdominal scales are much-branched, and in *S. hissetteum* Gibbins the opposite is the case—the ventral plate is almost identical with *alcocki* but the cuticular scales are simple (larvae of *hissetteum* have not been seen but Grenier & Rageau (1949) have described the larva, and figured the scales, under the name *S. vargasi* Grenier & Rageau which is synonymized with *hissetteum* by Freeman & de Meillon (1953)). The scales of *hissetteum* however are much smaller than those of *cervicornutum*, but the postgenal cleft is small as in *alcocki*.

The larvae of those species which live in so-called phoretic association with other Arthropods, i.e. the *neavei*-complex on crabs and the *copleyi*-complex on mayfly nymphs, do not completely fit in with the characters shown by free-living larvae, and on a purely larval classification extraordinary species like *S. berneri* Freeman might very reasonably be placed in a separate genus from *Simulium*. On the whole the mode of life of these species and their larval characters (some of which are no doubt adaptive to their unique environment) make them very different from other species of *Simulium*, and it is questionable whether it is legitimate to place them in the same group with S. *hirsutum* Pomeroy, as in Freeman & de Meillon's (1953) classification, although the male genitalia and pupal respiratory filaments are admittedly similar. Until their status can be more definitely ascertained it seems desirable, certainly useful in practice, to regard these unusual species as a group on their own, the *neavei*-group, which is in turn divided into two sub-groups, the *neavei*-complex on crabs and the *copleyi*-complex on mayflies (although it is not certain that the two complexes are monophyletic) ; it is then easier, as far as larval characters are concerned at any rate, to define Divisions A and B and the *hirsutum*-group.

An outline of the principal characteristics of the species-groups is given below, as they appear at present :

(1) S. *alcocki*-group. Ventral papillae present ; abdominal cuticle with branched somewhat fan-shaped scales ; head capsule with negative pattern ; postgenal cleft small and rounded ; hypostomium with usual nine apical teeth.

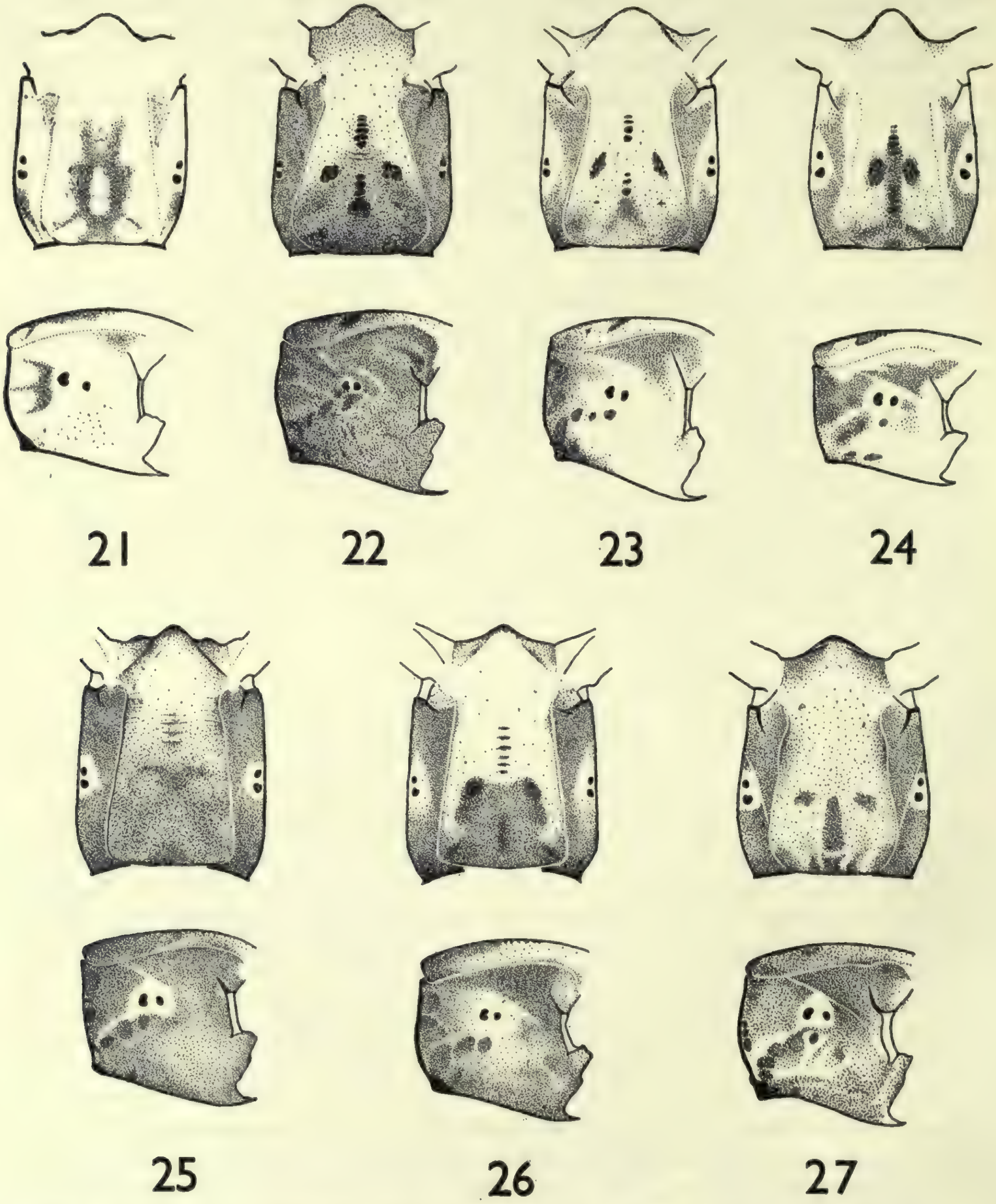
[Note. In material seen of S. *impukane* de Meillon from Nigeria and Nyasaland the pattern of the head is negative—traces of dark pigmentation around pale head-spots—as in other *alcocki*-group species. In Grenier & Doucet's (1949*b*) figure however the head-spots are clearly dark, which is unusual in Division A species except for the *ruficorne*-group, and furthermore the size they give—length 7 mm.—is much larger than that in *impukane* larvae as known from elsewhere. It is possible that Grenier & Doucet's material from Madagascar is not true *impukane*. In S. *kenyae* the postgenal cleft is of medium-size, transverse-oval in shape, and larger than in other species of this group.]

(2) S. *cervicornutum*-group. Ventral papillae present ; abdominal cuticle with very large scales, serrate apically ; head capsule with negative pattern ; postgenal cleft large ; hypostomium with usual nine apical teeth ; last abdominal segment usually with lateral accessory sclerites.

[Note. I include S. *schoutedeni* and S. *mcmahoni* in this group, and the larva of S. *bequaerti* Gibbins, not at present known, may come in here. The larva of S. *pauliani* Grenier & Doucet has cuticular setae of the *alcocki*-group type but the postgenal cleft resembles that of *unicornutum* ; its characters are therefore intermediate between those of most species in the *alcocki* and *cervicornutum*-groups.]

(3) S. *ruficorne*-group. Ventral papillae present ; cuticle bare ; head capsule with positive pattern ; postgenal cleft small or very small, usually subquadrate ; hypostomium with usual nine apical teeth ; last abdominal segment sometimes with traces of accessory sclerotizations.

[Note. This is perhaps the most distinctive group with the unusual combination of dark head-spots *and* ventral papillae ; the absence of scales or setae is also a difference from other Division A species, and the maxillary palp is unusually long and narrow. The larvae described as *Simulium* sp. M_3 and M_4 from Madagascar by Grenier & Doucet (1949*a*) evidently belong in this group, and in the figures they give of M_4 there seems to be no distinction from *ruficorne* (the remarkable mandibular serrations with the enlarged posterior serration, the absence of antero-lateral head-spots, the postgenal cleft and the hypostomial teeth appear identical).]



FIGS. 21–27. Head pattern and pigmentation of (21) *S. adersi* ; (22) *S. dentulosum* ; (23) *S. loutetense* ; (24) *S. medusaeforme hargreavesi* ; (25) *S. vorax* ; (26) *S. colas-belcouri* ; (27) *S. damnosum*.

(4) *S. hirsutum*-group (excluding *neavei-copleyi*-complexes). Ventral papillae present, usually small ; abdominal cuticle with scattered simple spine-like setae ; head capsule with negative pattern or unpigmented ; postgenal cleft of medium size, subcircular ; hypostomium with usual nine apical teeth.

[Note. In the material of *S. adersi* Pomeroy described by Gibbins (1934) from Nsadzi Island, Lake Victoria, ventral papillae are absent and larvae are much larger than those of *adersi* as known from elsewhere. It is possible that so-called *adersi* is a complex of sibling species. There are no larvae available from the type locality, Zanzibar, to ascertain the characters of true *adersi*.]

(5) *S. neavei*-group. Head capsule rather elongate or strongly arched and contracted behind ; eye-spots very small ; hypostomium unusual, with a more or less regular row of 13 apical teeth in *neavei*-complex but of varied form in *copleyi*-complex ; head capsule without distinct pigmentation or with faint pigmentation around areas of pale head-spots ; postgenal cleft small, subquadrate or absent ; abdominal segmentation unusually distinctly marked ; ventral papillae absent ; rectal scales absent or represented only by minute vestiges ; arms of anal sclerite long and narrow, anterior arms rather less strongly divergent than usual ; anal sclerite tending to lie in an apical position instead of a strictly dorsal position, and posterior circlet usually rather oblique in a ventro-apical position instead of the usual strictly apical position.

[Note. The cuticular ornamentation is variable ; in some cases the cuticle is bare, e.g. *S. ovazzae* Grenier & Mouchet, and perhaps all *neavei*-complex species, but in *S. berneri* the whole cuticle is densely covered with pale clubbed hairs. The tendency shown in these species for the posterior circlet to come to lie rather obliquely in a slightly ventro-apical position instead of directly across the apex of the abdomen is presumably an adaptation to life on the mobile host.]

(6) *S. griseicolle*-group. Ventral papillae absent ; cuticle of thorax and abdomen densely covered with setae of two types, simple spine-like setae and branched fan-like scales ; head capsule without pattern, pale ; postgenal cleft very large, subcircular ; hypostomium with usual row of nine apical teeth ; mandible with one serration only.

[Note. This group includes only *S. griseicolle* Becker and *S. gariepensis* de Meillon which are the only Ethiopian species in which the adult is without setae on the basal section of the radius. The larva of *gariepensis* however is not known and therefore may not fully conform with the characters given above.]

(7) *S. dentulosum*-group. Ventral papillae absent ; cuticle bare ; head capsule with positive pattern ; postgenal cleft small ; hypostomium with usual nine apical teeth, the teeth rather blunt ; often large larvae up to 11 mm. usually grey in colour with abdomen of gradually expanding form.

[Note. The dark head-spots of this group are usually very distinct, but are sometimes obscured by general dark pigmentation. The hypostomial setae are very numerous in some species and the hindmost setae may lie in two or three irregular rows. Most species live in swift water and consequently the number of rows of hooks and the number of hooks in each row of the circlets are often very high. *Simulium gyas* de Meillon, described as *Simulium* sp. M_6 from Madagascar by Grenier & Doucet (1949*b*), apparently has simple setae on the cuticle of the posterior abdominal segments, and a medium-sized cordate postgenal cleft, providing an exception to the characters of the group as given above. Its larval characters are therefore very close to those of *S. medusaeforme*, and the pupal respiratory organ is also of medusaeform type; the adult is unknown, and, as Freeman & de Meillon point out, the affinities of *S. gyas* are uncertain. On larval characters I would place it in the *medusaeforme*-group. Gibbins (1939) also describes the larva of *S. kauntzeum* Gibbins, a species closely related to *S. dentulosum* Roubaud, as having " minute spines " on the abdomen, but the cuticle appears to be quite bare in Gibbins' slide of *kauntzeum* (in B.M. collection) and as far as can be seen from the imperfect specimen is very like *dentulosum*. The larvae of *S. ambositrae* Grenier & Grjébine (1958) (described under the name *S. neireti* Roubaud by Grenier & Doucet (1949*a*)) and of *S. imerinae* Roubaud from Madagascar are unusual as the rectal gills are formed of three simple lobes which are brownish in colour; these species and *S. milloti* Grenier & Doucet are also unusual in that the second antennal segment shows more or less distinct secondary annulation, which is not known in the larvae of other Ethiopian species. In *S. dentulosum* and *S. debegene* de Meillon the outer margin of the mandible is unusually strongly arched.]

(8) *S. medusaeforme*-group. Ventral papillae absent; abdominal cuticle with at least a few setae, either simple and spine-like or flattened and scale-like, never fan-shaped; head capsule with positive pattern, sometimes unpigmented; postgenal cleft medium-sized to very large, shape varied; hypostomium with usual nine apical teeth, the teeth short and blunt.

[Note. In this group the body form and size are very varied; in the small species (e.g. *S. bovis* de Meillon and *S. albivirgulatum* Wanson & Henrard) the body is usually pale, the abdomen of clubbed form (i.e. with the posterior segments set-off abruptly from the others) and the head unpigmented. These species have flattened abdominal scales, but larger species have sparse simple setae, often very few so that the cuticle is *apparently* bare in some cases. According to Gibbins (1939) the abdomen of *S. taylori* is without scales or spines, and the larva of *S. cavum* Gibbins according to Gibbins (1937)—under his earlier name *obscurum*—is " similar to *taylori* ". The B.M. collection has one slide of the larva of each species, made by Gibbins, but these show fragments only and it is impossible to confirm that the abdominal cuticle is bare. I think it probable that these species have a few sparse setae as in *colas-belcouri*, where the cuticle also is sometimes apparently bare but in which one or two scattered setae may always be found. Most species in this group show a median sclerotized projection from the anal sclerite which extends backwards towards the " seam " in the mid-dorsal line of the posterior circlet. A similar lightly sclerotized rod-like extension occurs in some of the *dentulosum*-group, but not in Division A species. It should be noted here that the *medusaeforme*-group is clearly equivalent to the genus *Wilhelmia* Enderlein and the larval characters agree extremely closely with those of the Palaearctic *Wilhelmia* as recorded by

Rubtzov (1956). In *Wilhelmia* larvae there is a positive pattern of dark head-spots, the postgenal cleft is mitre-shaped or subcordate in form, the hypostomial teeth are rather broad and blunt and only the median tooth is rather more prominent than the others, the hypostomial setae diverge posteriorly from the lateral hypostomial margin, the mandibular comb-teeth form an evenly decreasing row, the anterior mandibular serration is sometimes elongate (e.g. *W. angustifurca* Rubtzov), and the combined length of third and fourth antennal segments is distinctly shorter than the second segment. Following Rubtzov's classification the *medusaeforme*-group would have to be placed in *Wilhelmia*, not only on larval characters but on those of the other stages as well.]

It is difficult to distinguish Division A from Division B completely reliably on larval characters, but omitting the *neavei*-group they may be more or less defined as below :

> *Division A.* Ventral papillae present ; head capsule usually with negative pattern ; hypostomium usually with median and corner teeth considerably more prominent than the others ; hypostomial setae lying subparallel to lateral margin of hypostomium ; first three comb-teeth of mandible of different form from succeeding teeth ; third and fourth antennal segments combined usually as long as or longer than second segment ; number of hooks and rows in circlets usually comparatively few ; abdomen of clubbed form, i.e. with posterior segments more or less distinctly set-off from the anterior segments (as in Text-fig. 7).
>
> *Division B.* Ventral papillae absent ; head capsule with positive pattern, occasionally unpigmented ; hypostomium normally with apical teeth rather broad and blunt, median and corner teeth not very prominent ; hypostomial setae diverging posteriorly from lateral margin of hypostomium (not noticeably in *griseicolle*) ; comb-teeth of mandible usually large and forming an evenly decreasing row ; third and fourth antennal segments combined shorter than second segment ; number of hooks and rows in circlets usually very high ; abdomen rarely clubbed, usually more gradually expanding apically and then contracting abruptly to posterior circlet.

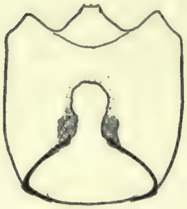
KEY TO SPECIES-GROUPS OF LARVAE OF ETHIOPIAN SIMULIIDAE

I give below a preliminary key to the species-groups, but this is by no means perfect and some intermediate species may be difficult to place ; these exceptions have been alluded to in the discussion above.

Separation of genera *Cnephia* and *Simulium* (no entirely reliable character has been found) :

Hypostomium of the *Prosimulium* type ; mandible with at least traces of three serrations or with a series of serrations ; rectal gills with three simple lobes ; cuticle bare ; apical half of antenna strongly pigmented with a very distinct intersegmental unpigmented ring between second and third segments . . *Cnephia*

Hypostomium not of this type ; mandible with two serrations or only one (traces of third serration known in two Madagascan species) ; rectal gills normally with numerous secondary lobules, very rarely simply trilobed ; cuticle frequently with setae ; antennal pigmentation weak with indistinct unpigmented ring . *Simulium*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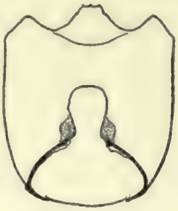
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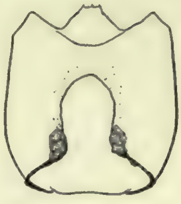
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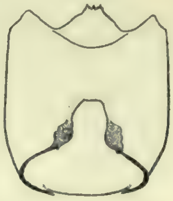
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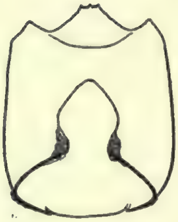
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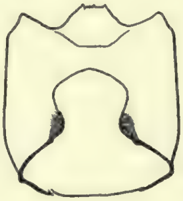
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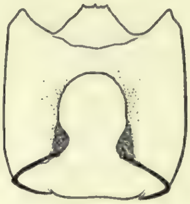
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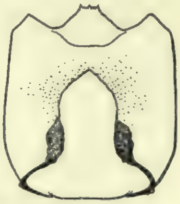
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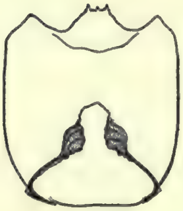
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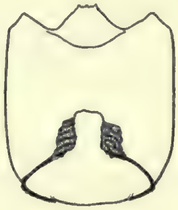
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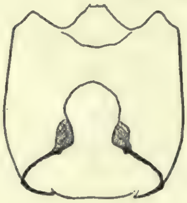
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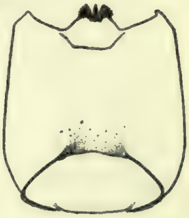
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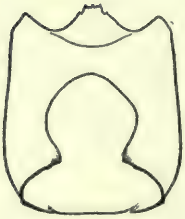
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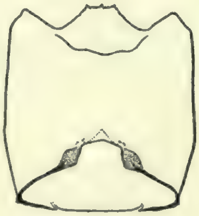
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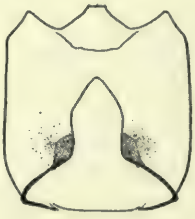
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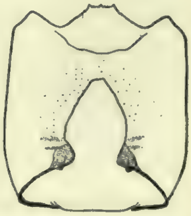
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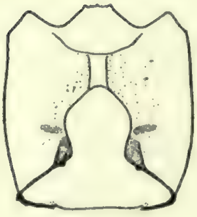
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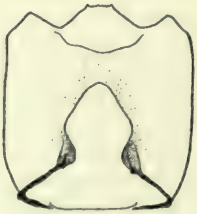
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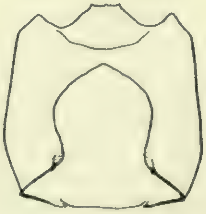
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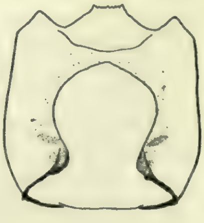
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Species-groups of *Simulium*

1. Larvae living on crabs or mayfly nymphs ; rectal scales absent ; eye-spots usually very reduced ; posterior circlet usually more ventral in position, and anal sclerite more apical in position than usual . . . . . . *neavei*-group 2

–. Larvae living normally, not attached to other Arthropods ; rectal scales present (except *damnosum*) (Text-figs. 11 and 12) ; eye-spots normal, rarely very reduced ; posterior circlet in usual distinctly apical position, and anal sclerite in normal dorsal position 3

2. Larvae attached to crabs ; hypostomium with a more or less even row of 13 apical teeth . . . . *neavei*-complex

–. Larvae attached to mayfly nymphs ; hypostomium of varied form but not as above *copleyi*-complex

3. Abdominal cuticle with two distinct types of setae, both simple spines and some fan-shaped scales ; thoracic cuticle with setae ; mandible with one serration only ; postgenal cleft very large and circular ; head capsule pale and unpigmented *griseicolle*-group

–. Abdominal cuticle bare or with one type of seta or scale only, but size of setae may vary ; thoracic cuticle bare (except *damnosum*) ; mandible with two serrations ; postgenal cleft rarely very large and circular ; head capsule usually with some pigmentation or pattern 4

4. Ventral papillae present ; hypostomial setae lying parallel to lateral margin of hypostomium ; apical teeth of hypostomium usually pointed and median and corner teeth distinctly prominent ; combined length of third and fourth antennal segments usually longer than second segment or at least as long ; head usually with negative pattern 5

–. Ventral papillae absent ; hypostomial setae diverging posteriorly from lateral margin of hypostomium ; apical teeth of hypostomium rather broad and blunt and median and corner teeth usually not strongly prominent ; combined length of third and fourth antennal segments shorter than second segment ; head with positive pattern, rarely unpigmented 8

5. Head with positive pattern of distinct dark spots ; cuticle bare ; postgenal cleft small so that postgenal bridge is as long as or longer than hypostomium ; pupal respiratory histoblast with four filaments . . . . . . *ruficorne*-group

–. Head with negative pattern of pale spots with darker surrounding pigmentation or entirely pale ; abdominal cuticle with setae ; postgenal cleft of varied form ; pupal respiratory histoblast not with four filaments 6

6. Abdominal cuticle dorsally with large erect scales ; last abdominal segment usually with small lateral accessory sclerites ; postgenal cleft large and postgenal bridge shorter than hypostomium ; pupal respiratory histoblast with two or more stout lobes or with eight filaments on a long common cylindrical trunk *cervicornutum*-group

–. Abdominal cuticle dorsally with branched fan-like scales or simple setae ; last abdominal segment without accessory sclerites ; postgenal cleft of small to medium size ; pupal respiratory histoblast with numerous simple tightly coiled filaments branching near the base, not carried on a long stalk . . . 7

FIGS. 28–47. Ventral view of head capsule showing postgenal cleft of (28) *S. alcocki* ; (29) *S. johannae* ; (30) *S. schoutedeni* ; (31) *S. impukane* ; (32) *S. mcmahoni* ; (33) *S. kenyae* ; (34) *S. cervicornutum* ; (35) *S. unicornutum* ; (36) *S. ruficorne* ; (37) *S. aureosimile* ; (38) *S. adersi* ; (39) *S. berneri* ; (40) *S. griseicolle* ; (41) *S. dentulosum* ; (42) *S. loutetense* ; (43) *S. medusaeforme hargreavesi* ; (44) *S. vorax* ; (45) *S. colas-belcouri* ; (46) *S. bovis* ; (47) *S. damnosum*.

7. Abdominal cuticle with branched fan-like scales ; postgenal cleft small and postgenal bridge a little longer than or about equal in length to hypostomium ; ventral papillae large and distinct . . . . *alcocki*-group

–. Abdominal cuticle with simple spine-like setae ; postgenal cleft of medium size, rather regularly circular, and postgenal bridge a little shorter than hypostomium ; ventral papillae small, sometimes indistinct . . . . . . *hirsutum*-group

8. Cuticle bare ; postgenal cleft normally small, subtriangular, pentagonal or subquadrate in shape, and postgenal bridge usually longer than hypostomium ; dark head-spots very distinct . . . . *dentulosum*-group

–. Cuticle with at least some simple setae or with dense scales ; postgenal cleft of medium or large size, mitre-shaped, cordate or very large and subcircular in shape, and postgenal bridge distinctly shorter than hypostomium ; dark head-spots often obscured by general dark infuscation of head capsule . *medusaeforme*-group

KEY FOR THE IDENTIFICATION OF LARVAE OF WEST AFRICAN BLACK-FLIES

The larvae of certain West African species of *Simulium* are difficult to key out satisfactorily, especially pairs of closely related species such as *schoutedeni* and *mcmahoni*, *adersi* and *hirsutum*, and *alcocki* and *johannae*. The characters given are the best which I have been able to find with the limited material available, and this should be borne in mind especially in the case of couplets 12, 15, and 20. When the general body cuticle bears no socketed scales or setae the cuticle is described as " bare "; it should be noted however that even in these species there are normally some minute hairs located on the swollen areas between the lateral arms of the anal sclerite (e.g. as in *ruficorne*, Text-fig. 144).

1. Hypostomium of unusual form with a very large deeply-sunk median tooth and 5 subequal outwardly-directed teeth on either side (Text-fig. 68) ; postgenal cleft absent (Text-fig. 39) body densely covered with long pale club-shaped setae (Text-fig. 149) ; eye-spots very small ; larvae attached to mayfly nymphs
S. berneri Freeman (p. 55)

–. Hypostomium of usual form with an apical row of 9 teeth ; postgenal cleft present sometimes small ; setae if present not of this form ; eye-spots normal ; larvae living normally, not attached to mayfly nymphs 2

2. Cuticle of proleg with setae ; rectal scales absent ; anterior abdominal segments usually distinctly produced into paired dorso-lateral conical protuberances (Text-fig. 9) ; cuticle of thorax and abdomen densely covered with flattened scale-like setae (Text-fig. 154), the setae densely clustered on the abdominal tubercles . . . . *S. damnosum* Theobald (p. 69)

–. Cuticle of proleg bare ; rectal scales present (Text-figs. 11 and 12) ; anterior abdominal segments at most only very slightly swollen dorsally ; cuticle with setae confined to the dorsum of the abdomen (except in *griseicolle*) 3

3. Cuticle of thorax and abdomen with abundant simple setae and at least some branched fan-like scales postero-dorsally on the abdomen (Text-fig. 147) ; mandible with one serration only (Text-fig. 110) . . *S. griseicolle* Becker (p. 58)

–. Cuticle of thorax bare ; cuticle of abdomen bare or with one type of seta or scale only ; mandible with the usual two serrations 4

4. Ventral papillae present ; hypostomial setae lying more or less parallel to lateral margin of hypostomium (as in Text-fig. 59) ; first three comb-teeth of mandible distinctly differentiated from succeeding bristle-like teeth (Text-fig. 112) ; posterior circlet with comparatively few rows of hooks (Text-figs. 155–157) ; head capsule usually with negative pattern (not *ruficorne*-group) ; abdominal cuticle sometimes with branched fan-like setae 5

–. Ventral papillae absent; hypostomial setae more or less distinctly diverging posteriorly from lateral margin of hypostomium (as in Text-fig. 61); first three comb-teeth not distinctly differentiated from succeeding teeth (Text-fig. 113); posterior circlet usually with very numerous rows of hooks (Text-figs. 158–160); head capsule with positive pattern of dark head-spots (unpigmented in *bovis*); abdominal cuticle never with branched setae 16

5. Head capsule with positive pattern of dark head-spots; abdominal cuticle bare 6

–. Head capsule with negative pattern of pale head-spots with surrounding dark pigmentation or entirely unpigmented; abdominal cuticle with setae or scales . 7

6. Antero-lateral head-spots present (Text-fig. 19); hypostomial setae 6–7 in each row; median and corner teeth of hypostomium not strongly prominent (Text-fig. 59); mandibular serrations normal, posterior serration small (Text-fig. 98) *S. aureosimile* Pomeroy (p. 49)

–. Antero-lateral head-spots absent (Text-fig. 20); hypostomial setae 4–5 in each row; median and corner teeth of hypostomium very strongly prominent (Text-fig. 56); posterior serration of mandible enlarged and almost as large as anterior serration (Text-fig. 95) . . . . . . *S. ruficorne* Macquart (p. 48)

7. Abdominal cuticle dorsally with very large erect black scales; abdomen with very dark segmental mottling, sometimes appearing blackish; last abdominal segment usually with small lateral accessory sclerites (Text-fig. 155); postgenal cleft very large and postgenal bridge shorter than hypostomium . . . 8

–. Abdominal cuticle with small branched fan-like setae, usually recumbent, or with simple spine-like setae; abdomen with pale yellowish-brown segmental mottling and usually appearing rather pale; last abdominal segment without accessory sclerites; postgenal cleft small, of medium size or shaped as in Text-fig. 33, postgenal bridge usually as long as or longer than hypostomium . . . 11

8. Abdominal scales deeply incised apically into several long thin processes (Text-figs. 140 and 141); combined length of third and fourth antennal segments considerably longer than second segment (Text-figs. 71 and 73); head pigmentation usually absent or only weakly marked as in Text-fig. 15; pupal respiratory histoblast with eight tightly coiled filaments carried on a long curved cylindrical stem (Text-figs. 176 and 177) 9

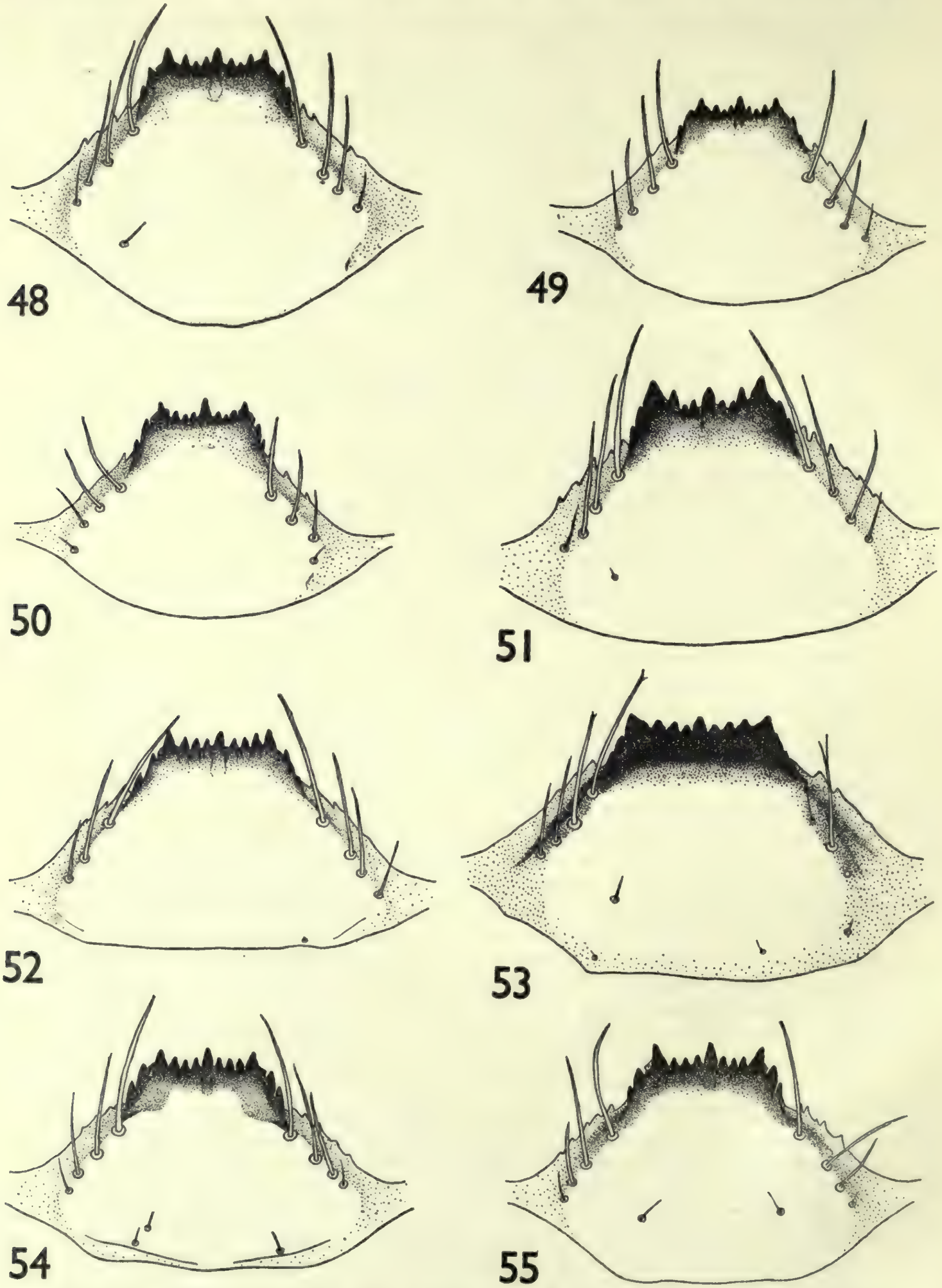
–. Abdominal scales only slightly serrate apically (Text-figs. 142 and 143); combined length of third and fourth antennal segments subequal to or even slightly shorter than second segment (Text-figs. 74 and 76); head pigmentation usually very strongly marked (Text-figs. 17 and 18); pupal respiratory histoblast not of this form 10

9. Postgenal cleft mitre-shaped (Text-fig. 30); last abdominal segment with small lateral accessory sclerites; abdominal scales with most of the processes arising near the apex (Text-fig. 140) . . . . *S. schoutedeni* Wanson (p. 37)

–. Postgenal cleft cordate in shape (Text-fig. 32); last abdominal segment without accessory sclerites; abdominal scales with the processes more divergent and arising more basally (Text-fig. 141) . . . *S. mcmahoni* de Meillon (p. 43)

10. Postgenal cleft mitre-shaped, pointed apically (Text-fig. 35); dark pigmentation on cephalic apotome usually forming an H-shaped mark not extending laterally to the cleavage lines (Text-fig. 18); median and corner teeth of hypostomium more distinctly prominent (Text-fig. 55); pupal respiratory histoblast formed of two broad lobes (Text-fig. 180) . . . . . *S. unicornutum* Pomeroy (p. 45)

—. Postgenal cleft rounded, curved apically (Text-fig. 34); dark pigmentation on cephalic apotome usually forming a lyre-shaped mark which extends in places to reach the cleavage lines (Text-fig. 17); median and corner teeth of hypostomium less prominent (Text-fig. 54); pupal respiratory histoblast formed of nine branches with five visible externally (Text-fig. 179) *S. cervicornutum* Pomeroy (p. 44)



Figs. 48–55. Hypostomium of (48) *S. alcocki* ; (49) *S. johannae* ; (50) *S. schoutedeni* ; (51) *S. impukane* ; (52) *S. mcmahoni* ; (53) *S. kenyae* ; (54) *S. cervicornutum* ; (55) *S. unicornutum.*

11. Abdominal cuticle with simple spine-like setae (Text-figs. 145 and 146); postgenal cleft of medium size and more or less circular (Text-fig. 38) 12

—. Abdominal cuticle with branched fan-like setae or scales (Text-figs. 136–139); postgenal cleft usually small 13

12. Median and corner teeth of hypostomium very prominent (Text-fig. 57); first antennal segment about 6 times as long as broad; maxillary palp about 3·1 times as long as breadth at base; pupal respiratory histoblast more or less regularly oval in outline (Text-fig. 184) with eleven filaments *S. adersi* Pomeroy (p. 53)

—. Median and corner teeth of hypostomium not strongly prominent (Text-fig. 58); first antennal segment about 7·5 times as long as broad; maxillary palp about 2·8 times as long as breadth at base; pupal respiratory histoblast more compressed postero-dorsally in outline (Text-fig. 183) with eight filaments *S. hirsutum* Pomeroy (p. 52)

13. Postgenal cleft transverse oval in shape and broadly open behind (Text-fig. 33); abdominal setae irregularly branched with the main branches usually having secondary forks (Text-fig. 139); head capsule sometimes very strongly pigmented (Text-fig. 16); apical teeth of hypostomium short and blunt, the median and corner teeth hardly at all prominent (Text-fig. 53); posterior circlet with about 85 rows of 13–16 hooks . . . . *S. kenyae* de Meillon (p. 41)

—. Postgenal cleft small and postgenal bridge at least as long as hypostomium; abdominal setae (Text-figs. 136–138) not secondarily branched; head capsule usually weakly pigmented (as in Text-fig. 13); median and corner teeth of hypostomium distinctly more prominent than intermediate teeth; posterior circlet with about 60–70 rows of usually about 8–12 hooks 14

14. Postgenal bridge distinctly longer than hypostomium, postgenal cleft more or less parallel-sided and truncate apically (Text-fig. 31); rectal gills simple or with only one or two thumb-like secondary lobules; maxillary palp long, about 3·2 times as long as breadth at base . . . . . . *S. impukane* de Meillon (p. 40)

—. Postgenal bridge about equal in length to or only slightly longer than hypostomium, postgenal cleft more rounded anteriorly and slightly contracted behind (Text-figs. 28 and 29); rectal gills with 6–8 secondary finger-like lobules in each lobe; maxillary palp about 2·6–3 times as long as breadth at base 15

15. Second antennal segment almost as long as first (Text-fig. 69); maxillary palp about 3 times as long as breadth at base . . . . . *S. alcocki* Pomeroy (p. 34)

—. Second antennal segment only about two-thirds as long as first (Text-fig. 70); maxillary palp about 2·6 times as long as breadth at base *S. johannae* Wanson (p. 37)

16. Head capsule entirely pale creamy-yellow, unpigmented; abdominal cuticle dorsally with numerous small flattened scales (Text-fig. 153); postgenal cleft extremely large and rounded, widely open behind (Text-fig. 46); mature larva very small, about 4·5 mm. in length . . . . . *S. bovis* de Meillon (p. 68)

—. Head capsule with dark head-spots and usually strongly infuscated with brown pigmentation; abdominal cuticle bare or with scattered simple spine-like setae; postgenal cleft not enormously enlarged; mature larva often very large, at least, 5·5 mm. in length 17

17. Abdominal cuticle bare, without setae; groups of head-spots very distinct (Text-figs. 22 and 23) 18

—. Abdominal cuticle with at least a few simple setae (Text-figs. 150–152); groups of head-spots sometimes indistinct and obscured by general dark pigmentation . 19

18. Length of mature larva 9–10·5 mm.; postgenal cleft very small, sometimes triangular but usually subquadrate (Text-fig. 41), postgenal bridge very long; hypostomial setae 12–18 in each row; cephalic fan with 54–70 rays; outer margin of mandible strongly arched (Text-fig. 90*c*); posterior circlet with about 220 rows of 24–39 hooks . . . . *S. dentulosum* Roubaud (p. 59)

—. Length of mature larva about 5·5 mm.; postgenal cleft large and mitre-shaped (Text-fig. 42), postgenal bridge shorter than hypostomium; hypostomial setae 6–7 in each row; cephalic fan with about 40 rays; outer margin of mandible normal (as in Text-fig. 90*a*); posterior circlet with about 70–80 rows of 13–16 hooks . . . . *S. loutetense* Grenier & Ovazza (p. 62)

19. Head capsule with dark head-spots more or less distinct at least on cephalic apotome but normally pale and unpigmented antero-laterally below the eye-spots (Text-fig. 24); mandible with anterior serration normal, not strongly elongate (Text-fig. 99); posterior circlet with about 140 rows of 18–30 hooks (Text-fig. 158); hypostomial setae 4–6 (usually 4) in each row; mature larva 5·75–7 (usually about 6) mm. in length; cephalic fan with with 38–45 rays *S. medusaeforme* Pomeroy (p. 63)

—. Head capsule with head-spots indistinct and head more or less strongly and evenly infuscated except anteriorly on cephalic apotome (Text-figs. 25 and 26); mandible with anterior serration very long and narrow (Text-figs. 102 and 105); posterior circlet with about 190–220 rows of 28–49 hooks (Text-fig. 159); hypostomial setae 7–10 in each row; cephalic fan with 50–60 rays; mature larva large, 7·75–9·25 mm. in length 20

20. Head capsule usually more evenly pigmented and less distinctly pale anteriorly on cephalic apotome (Text-fig. 25); postgenal cleft cordate in shape (Text-fig. 44), postgenal bridge with a distinct longitudinal very lightly pigmented area sometimes almost unsclerotized; median tooth of hypostomium distinctly prominent and corner teeth very blunt (Text-fig. 64); maxillary palp about 2·75 times as long as breadth at base; pupal respiratory histoblast with narrow branches (Text-fig. 192) . . . . *S. vorax* Pomeroy (p. 64)

—. Head capsule usually less evenly pigmented and distinctly pale anteriorly on cephalic apotome, the pale areas extending laterally on cephalic apotome towards the hind margin (Text-fig. 26); postgenal cleft elongate-cordate in shape (Text-fig. 45), more strongly tapering anteriorly, postgenal bridge with only faint traces of a longitudinal weakly sclerotized or weakly pigmented area; median tooth of hypostomium very blunt, scarcely if at all longer than intermediate teeth, corner teeth more pointed (Text-fig. 65); maxillary palp about 3 times as long as breadth at base; pupal respiratory histoblast with broad branches (Text-fig. 193) *S. colas-belcouri* Grenier & Ovazza (p. 67)

LARVAL DESCRIPTIONS

Note. Descriptions based on last stage larvae.

Simulium alcocki Pomeroy

Type form.

Length. Mature larva, 5 mm.

Head. Head capsule creamy-yellow, usually almost without pattern; pattern when present of negative type, lightly pigmented yellowish-brown as in *johannae* (Text-fig. 13) but sometimes with slight suffusions round the eye-spots. Postgenal cleft small and rounded (Text-fig. 28), postgenal bridge about equal in length to hypostomium. Hypostomium (Text-fig. 48) with usual row of 9 apical teeth, median and corner teeth moderately prominent; usually 4–6 strongly acute lateral serrations with the hindmost serration lying posterior to the first hypostomial seta; hypostomial setae 4–5 in each row, lying parallel to lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta subequal to that between corner teeth. Antenna (Text-fig. 69) long, very lightly pigmented, first segment about 6–7 times as long as broad, segment length ratios 5 : 4·6 : 6. Mandible of typical form, posterior serration present, small (Text-fig. 91), second comb tooth much smaller than first and shorter than third. Maxillary palp about 3 times as long as breadth at base (Text-fig. 115). Cephalic fan with 42–44 rays (Roubaud & Grenier (1943) give 20–25).

Thorax. Milky-white with variable dark banding; cuticle bare. Proleg circlet with about 19 rows of 5–6 hooks; lateral plate very weakly pigmented, with about 9 processes. Pupal respiratory histoblast with 7 thin tightly coiled filaments, first division near the base (Text-fig. 173).

Abdomen. Shaped as in Text-fig. 7; milky or yellowish-white with brown segmental mottling, clear white ventro-apically. Ventral papillae present, large and pointed. Cuticle of dorsum with small scattered, strongly sclerotized, fan-shaped scales (Text-fig. 136). Rectal scales present. Rectal gills with 7–9 finger-like secondary lobules on each lobe. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to about 10th row of hooks. Posterior circlet with about 61–70 rows of 8–15 hooks.

MATERIAL EXAMINED. From Northern Nigeria, Southern Cameroons, Sierra Leone.

LARVAL HABITAT AND RANGE. Larvae are found mostly on dead leaves or on trailing grass in slowly-flowing, often heavily shaded streams; they are rarely very numerous in any one place, and commonly exist among the larvae of *johannae, alcocki occidentale, unicornutum* and *cervicornutum.* Widely distributed over Tropical Africa south to Natal.

Simulium alcocki form ***occidentale*** Freeman & de Meillon

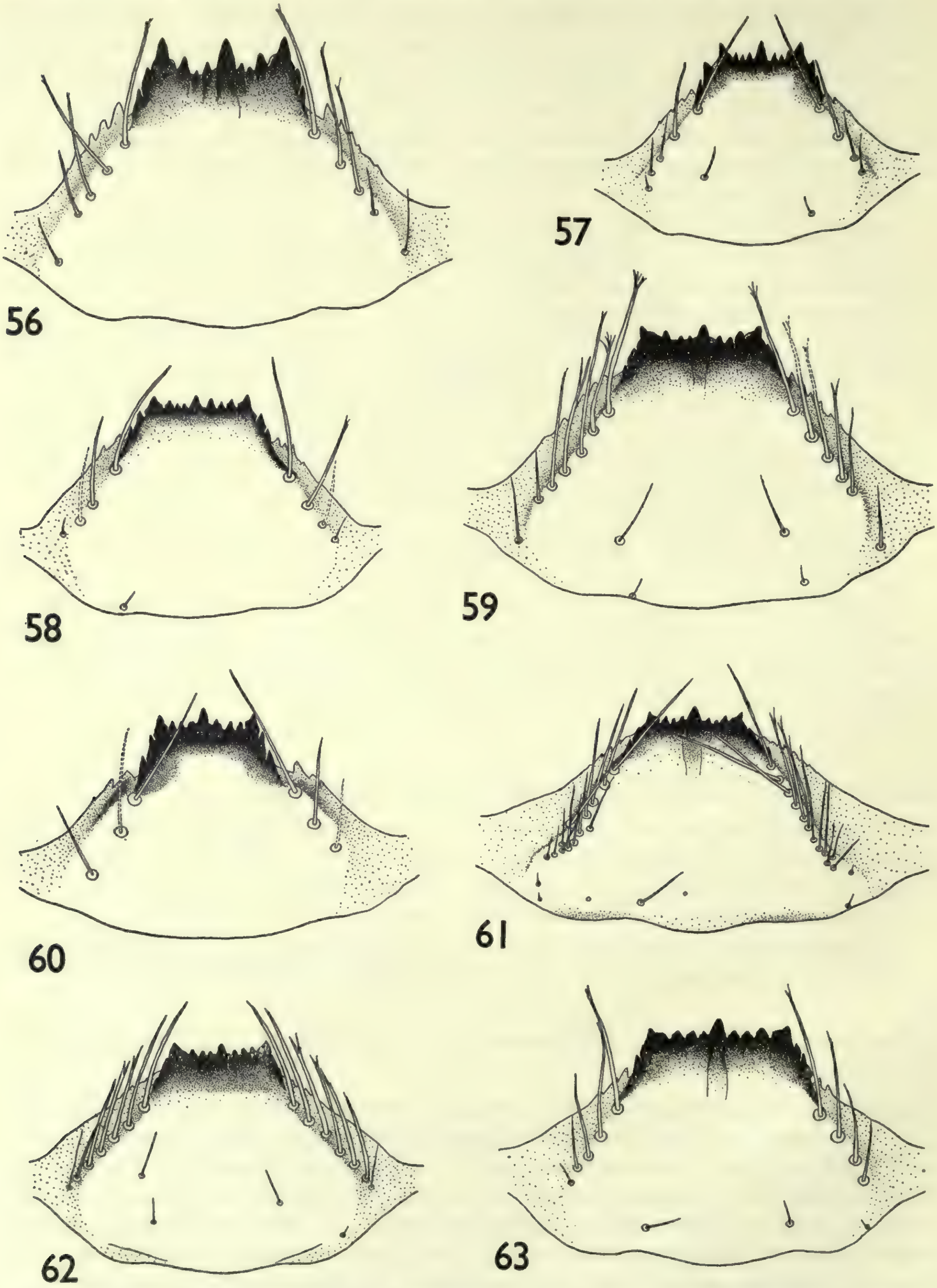
Larvae examined are not distinguishable from *alcocki* type form except on the pupal respiratory histoblast of mature larvae which is 10-filamented and closely similar to that of *johannae* (from which no reliable differences have been found).

MATERIAL EXAMINED. From Northern Nigeria.

LARVAL HABITAT AND RANGE. Habitat as in the type form; locally distributed in West Africa but probably commoner than the few records suggest.

[***Simulium alcocki*** form ***djallonense*** Roubaud & Grenier and form ***coalitum*** Pomeroy

Larvae of these forms are not known and may prove to be indistinguishable from the type form except in the pupal respiratory histoblast; the respiratory organ in the pupae of both forms is comprised of 10 filaments. In *coalitum* the filaments are borne on a long common stalk which will be evident in semi-mature and mature larvae, but in *djallonense* the branching occurs near the base and the pupal respiratory histoblast must closely resemble that in *alcocki occidentale* and *johannae.* Both forms appear to be very localized: *djallonense*—Guinea and Nigeria, *coalitum*—Nigeria and Ghana.]



FIGS. 56–63. Hypostomium of (56) *S. ruficorne*; (57) *S. adersi*; (58) *S. hirsutum*; (59) *S. aureosimile*; (60) *S. griseicolle*; (61) *S. dentulosum*; (62) *S. loutetense*; (63) *S. medusaeforme hargreavesi*.

Simulium johannae Wanson

Closely similar to *alcocki* but mature larvae smaller.

Length. Mature larva, 4–4·5 mm.

Head. Head capsule creamy-yellow without pattern or with a faintly marked negative pattern on the cephalic apotome (Text-fig. 13) ; sides of head with only faint traces of dark pigmentation in material seen. Postgenal cleft small and rounded (Text-fig. 29), as a rule a little more parallel-sided than in *alcocki*, postgenal bridge about equal in length to, or a little longer than, hypostomium. Hypostomium (Text-fig. 49) with usual row of 9 apical teeth, median and corner teeth moderately prominent ; 4–6 lateral serrations with the hindmost serration lying posterior to or level with the first hypostomial seta ; hypostomial setae 3–4 in each row, lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta subequal to or a little less than that between corner teeth. Antenna (Text-fig. 70) long, almost unpigmented, first segment about 7–7·5 times as long as broad, segment length ratios 14 : 8 : 16. Mandible of typical form, posterior serration present, very small (Text-fig. 94), second comb tooth much smaller than first and shorter than third. Maxillary palp about 2·6 times as long as breadth at base (Text-fig. 116). Cephalic fan with 34–40 rays (Grenier & Rageau (1949) give " about 20 " in their description of *roubaudi* = *johannae*).

Thorax. Yellowish-white with usual darker banding ; cuticle bare. Proleg circlet with about 20 rows of 5–6 hooks ; lateral plate unpigmented, apparently with about 6–9 processes. Pupal respiratory histoblast with 10 thin tightly coiled filaments, first division near the base (Text-fig. 174).

Abdomen. Shaped as in Text-fig. 7 ; yellowish-white with well-developed brownish segmental mottling, clear white ventro-apically. Ventral papillae present, large and rather pointed. Cuticle of dorsum with numerous small strongly sclerotized fan-shaped scales (Text-fig. 137) similar to those in *alcocki* (without scales according to Grenier & Rageau (1949)). Rectal scales present. Rectal gills with 6–8 finger-like secondary lobules on each lobe. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to about 10th or 11th row of hooks. Posterior circlet with about 60 rows of 8–10 hooks.

MATERIAL EXAMINED. From Northern Nigeria, Southern Cameroons, Sierra Leone.

LARVAL HABITAT AND RANGE. Larvae occur on dead leaves and grasses in small streams, usually well shaded, most commonly in slowly-flowing water but sometimes in swifter streams and often in association with other small-stream species such as *alcocki*, *unicornutum*, and *schoutedeni*. Principally West and Equatorial Africa south to Northern Rhodesia.

Simulium schoutedeni Wanson

Closely similar to *unicornutum* but head capsule almost devoid of pigmentation in material seen.

Length. Mature larva, 3·75–4 mm.

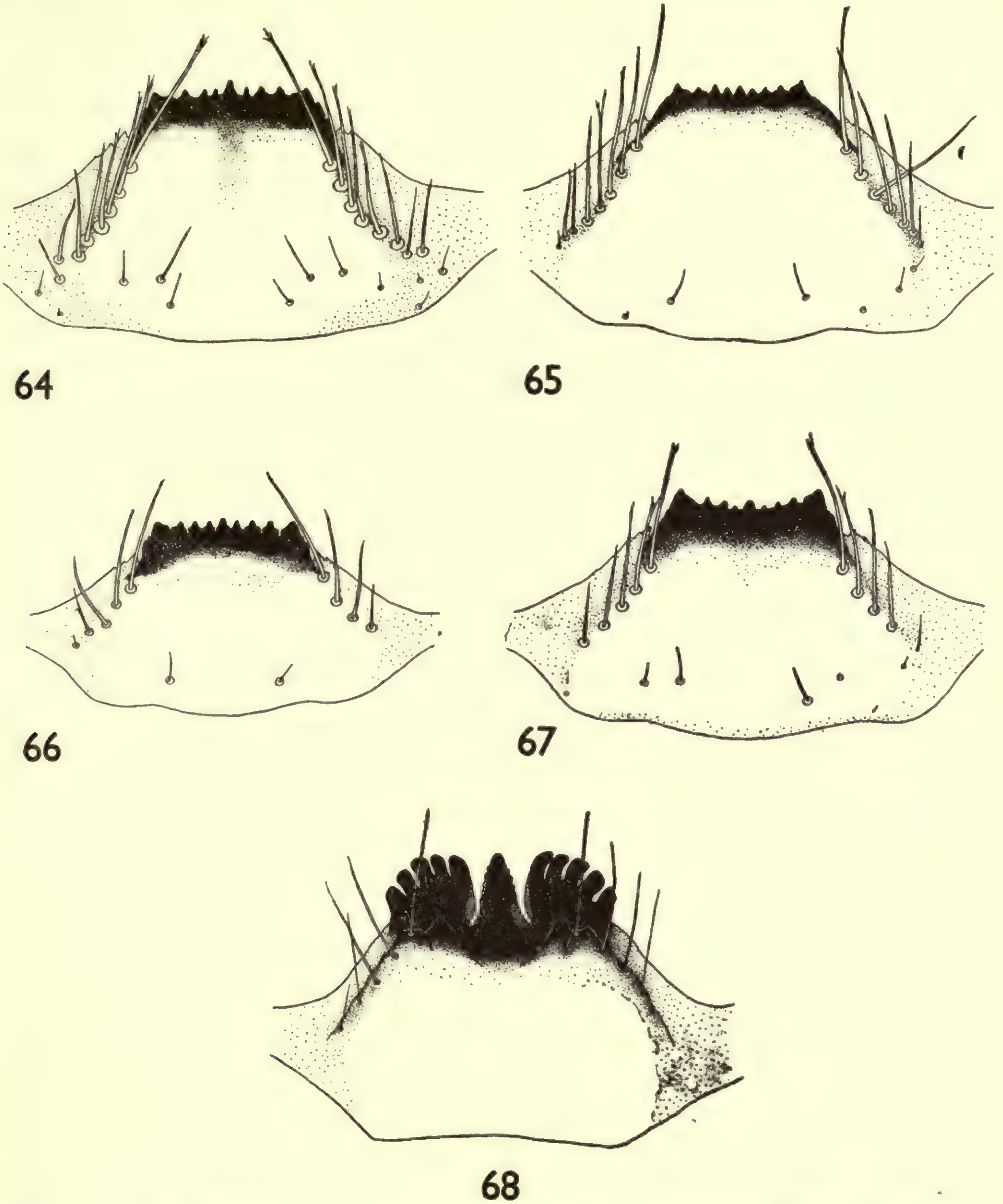
Head. Head capsule pale creamy-yellow without pigmentation or with only faintest traces of negative pattern on the cephalic apotome (only a few larvae seen). Postgenal cleft large, almost twice as long as its basal width and similar to that of *unicornutum* but less pointed apically (cf. Text-figs. 30 and 35), postgenal bridge a little shorter than hypostomium. Hypostomium (Text-fig. 50) with usual row of 9 apical teeth, median and corner teeth strongly developed as in the *cervicornutum* group ; about 5 lateral serrations with the hindmost serration usually lying posterior to the first hypostomial seta ; hypostomial setae 4 in each row, lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta subequal to or a little greater than that between corner teeth. Antenna (Text-fig. 71) long, unpigmented, first segment about 7 times as long as broad, segment length ratios 5 : 3·6 : 6. Mandible of typical form, posterior serration present, small (Text-fig. 97), second comb tooth much smaller than first and shorter than third. Maxillary palp 2·5 times as long as breadth at base (Text-fig. 117). Cephalic fan with about 35 rays.

Thorax. Whitish with extensive dark mottling ; cuticle dorsally with numerous very minute colourless hairs. Proleg circlet with about 20 rows of 5–6 hooks ; lateral plate unpigmented, with about (?) 6-8 processes. Pupal respiratory histoblast with 8 thin tightly coiled filaments carried on a long stalk which does not divide before the postero-ventral curve of the " gill-spot " (Text-fig. 176).

Abdomen. Shaped as in Text-fig. 7, but sometimes with small dorso-lateral swellings on the intermediate abdominal segments ; pale grey or yellowish-grey with extensive very dark segmental mottling, pale yellowish ventro-apically. Ventral papillae present, large and pointed. Cuticle dorsally and laterally on posterior segments with numerous erect black scales, the scales deeply incised apically into about 10–12 parallel-sided finger-like processes (Text-fig. 140) ; cuticle of anterior segments dorsally with minute colourless hairs as on the thorax, but without scales. Last abdominal segment just anterior to posterior circlet with a small black sclerite as in *unicornutum* (Text-fig. 155). Rectal scales present. Rectal gills with secondary lobules (not sufficiently extended in material seen for counting but probably few). Anal sclerite of usual form, strongly sclerotized, posterior arm extending to about 12th row of hooks. Posterior circlet with about 65 rows of 8–10 hooks.

MATERIAL EXAMINED. From Northern Nigeria (5 larvae only).

LARVAL HABITAT AND RANGE. The larvae collected by me were in very small slowly-flowing streams attached to blades of grass dipping into the water. Wanson (1947) records the species from swift current, but it seems to be most often found in slow streams, sometimes associated with *alcocki*, *johannae* and *unicornutum*. The larvae are extremely similar to those of *unicornutum*, with the same dark coloration, presence of the pair of small sclerites on the last abdominal segment, similar large black abdominal scales, and similar postgenal cleft. Mature specimens can very easily be distinguished by the respiratory histoblast (cf. Text-figs. 176 and 180), but younger larvae may be confused. The species is known from Sierra Leone to Belgian Congo, but records are few, perhaps because it seldom occurs in large numbers and is easily overlooked.



FIGS. 64–68. Hypostomium of (64) *S. vorax* ; (65) *S. colas-belcouri* ; (66) *S. bovis* ; (67) *S. damnosum* ; (68) *S. berneri*.

Simulium impukane de Meillon

Larva closely similar to *alcocki* ; no reliable means of separation has been found.

Length. Mature larva, 4·75–5 mm.

Head. Head capsule pale yellowish-white with variable yellow-brown negative pattern (Text-fig. 14), sometimes almost unpigmented. Postgenal cleft small, subquadrate or very slightly rounded (Text-fig. 31), somewhat similar to *aureosimile* ; postgenal bridge long, distinctly longer than the hypostomium. Hypostomium (Text-fig. 51) with usual row of 9 apical teeth, median and corner teeth strongly prominent and more developed than in most *alcocki*-group species, the middle one of the intermediate teeth small and strongly sunken between the other intermediate teeth ; 6–9 strongly developed lateral serrations with the hindmost serration lying well posterior to the first hypostomial seta ; hypostomial setae 4–5 in each row, most often 4, lying subparallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta subequal to that between corner teeth. Antenna (Text-fig. 72) long, almost unpigmented, first segment about 7 times as long as broad, segment length ratios 7 : 6 : 10. Mandible of typical form, posterior serration present, small (Text-fig. 100), second comb tooth much smaller than first and shorter than third. Maxillary palp long, 3·2 times as long as breadth at base. Cephalic fan with 38–41 rays.

Thorax. Yellowish-white with pale brown banding ; cuticle bare. Proleg circlet with about 22 rows of 5–6 hooks ; lateral plate unpigmented, with about 8 processes. Pupal respiratory histoblast with 10 thin tightly coiled filaments, first divisions near the base ; postero-dorsal edge of the " gill-spot " more strongly compressed towards the centre than in *alcocki* (Text-fig. 175).

Abdomen. Shaped as in Text-fig. 7 ; pale yellowish-white with yellow-brown or brown segmental mottling, whitish ventro-apically. Ventral papillae present, slightly pointed. Cuticle of the posterior abdominal segments dorsally with numerous strongly sclerotized fan-shaped scales (Text-fig. 138) similar to those of *alcocki* but sometimes rather more parallel-sided and longer. Rectal scales present. Rectal gills unusually simple in material seen, each lobe either without secondary lobules (Text-fig. 172) or with one or two small thumb-like secondary lobules on the lateral lobes (this may not always be the case and further material may show more numerous digitate secondary lobules). Anal sclerite of usual form, strongly sclerotized (Text-fig. 163), posterior arms extending to about 11th row of hooks. Posterior circlet with about 64–67 rows of 8–12 hooks.

MATERIAL EXAMINED. From Northern Nigeria and Nyasaland.

LARVAL HABITAT AND RANGE. Larvae occur in small streams attached to dead leaves, grasses and stones, sometimes in swift shallow water, but often in slow muddy water where detritus and algae accumulate. Known from West Africa (Ghana) to South Africa, but records are few ; *impukane* is very easily confused with forms of *alcocki*, but in Nigeria at any rate seems to occur frequently on its own unassociated with other species.

Simulium kenyae de Meillon

Length. Mature larva, 5 mm.

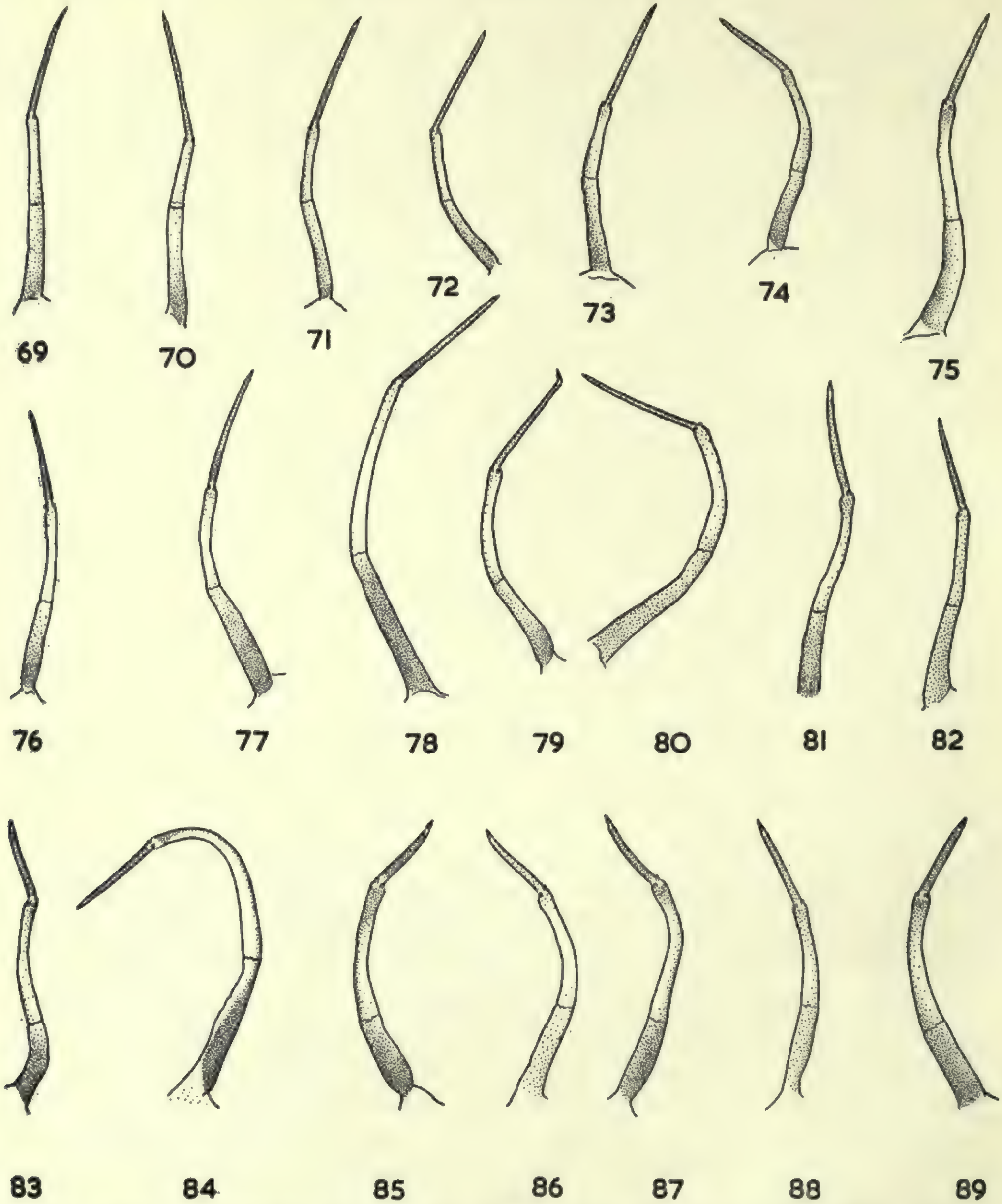
Head. Head capsule pale yellowish-white with variable brown negative pattern sometimes very strongly pigmented (Text-fig. 16), and similar to *cervicornutum*, the brown pigmentation extending laterally on the cephalic apotome to the cleavage line thereby delimiting the pale head-spots clearly into antero- and postero-median and antero- and postero-lateral groups ; pale spots on sides of head usually clearly marked and the postero-ventral region of the head darkly pigmented. Postgenal cleft of unusual form, large and broader than long, anterior margin rounded but with a very slight trace of a widely obtuse angle (Text-fig. 33) ; postgenal bridge short, little more than half as long as hypostomium. Hypostomium (Text-fig. 53) with usual row of 9 apical teeth, the median and corner teeth little developed so that the anterior teeth form an almost even row as in *medusaeforme*-group species with subequal intermediate teeth and broad blunt corner teeth ; 3–5 lateral serrations with the hindmost serration about level with or only just posterior to first hypostomial seta ; hypostomial setae 4–5 in each row (3 seen also in one specimen but probably exceptional), lying subparallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta only about two-thirds of that between corner teeth. Antenna (Text-fig. 75) relatively shorter than in most *alcocki*-group species and only slightly longer than stem of cephalic fan, with third segment shorter than second, first segment moderately pigmented and 5–5·5 times as long as broad, segment length ratios 6 : 6 : 5. Mandible of typical form, posterior serration present, small (Text-fig. 103), second comb tooth longer than third so that the 3 comb teeth form a gradually diminishing series, bristle-like teeth very long and strong and the first tooth of this series at least twice as long as third comb tooth. Maxillary palp about 2·8 times as long as breadth at base (Text-fig. 120). Cephalic fan with about 38–40 rays.

Thorax. Yellowish-white with pale brown banding ; cuticle bare. Proleg circlet with about 36 rows of 8–12 hooks ; lateral plate lightly pigmented, with about 18 processes. Pupal respiratory histoblast with 8 thin tightly coiled filaments arising in pairs with divisions very near the base (Text-fig. 178), shape rather obliquely elongate.

Abdomen. Probably shaped as in Text-fig. 7 ; yellowish-white with brown segmental mottling, milky-white ventro-apically. Ventral papillae present. Cuticle postero-dorsally with numerous small compound scales, sometimes of simple fan type, but usually with the branches further subdivided (Text-fig. 139), the scales black, strongly sclerotized. Rectal scales present. Rectal gills with numerous finger-like secondary lobules, about 10–14 in each lobe. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to about 13th–15th row of hooks. Posterior circlet with about 82–85 rows of 13–16 hooks.

MATERIAL EXAMINED. From Southern Cameroons.

LARVAL HABITAT AND RANGE. This is a swift-water species, and larvae and pupae occur mostly on trailing grasses in turbulent, rocky-bedded streams ; the larva of *kenyae* has more hooks per row and more rows of hooks in both the posterior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FIGS. 69–89. Antenna of (69) *S. alcocki*; (70) *S. johannae*; (71) *S. schoutedeni*; (72) *S. impukane*; (73) *S. mamahoni*; (74) *S. cervicornutum*; (75) *S. kenyae*; (76) *S. unicornutum*; (77) *S. ruficorne*; (78) *S. aureosimile*; (79) *S. adersi*; (80) *S. hirsutum*; (81) *S. berneri*; (82) *S. griseicolle*; (83) *S. loutetense*; (84) *S. dentulosum*; (85) *S. vorax*: (86) *S. medusaeforme hargreavesi*; (87) *S. colas-belcouri*; (88) *S. bovis*; (89) *S. damnosum*.

and the proleg circlets and the secondary lobules of the gills are more numerous than in other species of the *alcocki*-group, adaptations to its preferred habitat in fast-moving water. West and Equatorial Africa from Liberia to Sudan and Uganda, but not known south of Ruanda Urundi.

Simulium mcmahoni de Meillon

Larva similar to *unicornutum* and *schoutedeni* with erect black scales on dorsum of posterior abdominal segments.

Length. Mature larva, 4–4·5 mm.

Head. Head capsule pale yellow with variably developed negative pattern (Text-fig. 15), the dark pigmentation often extending towards the cleavage line on the cephalic apotome as in *cervicornutum* and clearly delimiting the pale postero-median and postero-lateral head-spots; postero-ventral areas of head capsule usually extensively darkened. Postgenal cleft large and shaped as in Text-fig. 32, less parallel-sided than in *unicornutum* and less pointed apically; postgenal bridge a little shorter than hypostomium. Hypostomium (Text-fig. 52) with usual row of 9 apical teeth, median and corner teeth moderately prominent and intermediate teeth well developed and subequal in size; 4–6 lateral serrations with the hindmost serration lying about level with the first hypostomial seta; hypostomial setae 3–4 in each row, lying parallel to lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta subequal to that between corner teeth. Antenna (Text-fig. 73) long, first segment lightly pigmented and about 6·5–7 times as long as broad, segment length ratios 5 : 3·8 : 5·6. Mandible of typical form, posterior serration present, small (Text-fig. 106), second comb tooth much smaller than first and slightly shorter than third. Maxillary palp about 2·75 times as long as breadth at base (Text-fig. 119). Cephalic fan with 33–41 rays.

Thorax. Pale yellowish-grey with pale brown banding; cuticle dorsally with minute colourless hairs. Proleg circlet with about 20 rows of 6–8 hooks; lateral plate with about 12 processes. Pupal respiratory histoblast with 8 thin tightly coiled filaments borne on a long stalk (Text-fig. 177), rather similar to *schoutedeni.*

Abdomen. Shaped as in Text-fig. 7, but some specimens with dorso-lateral swellings on intermediate segments; yellowish-grey with brown segmental mottling, pale yellowish ventro-apically. Ventral papillae present, small. Cuticle dorsally and dorso-laterally on posterior segments with numerous erect black scales, the scales (Text-fig. 141) deeply incised apically into about 12 finger-like processes, the processes reaching nearer to the base of the scale than in *schoutedeni*; cuticle of anterior segments dorsally with minute colourless hairs as on the thorax. Last abdominal segment laterally *without* small black sclerite in material seen. Rectal scales present. Rectal gills with median lobe simple or with one thumb-like secondary lobule, lateral lobes with 2–3 secondary lobules (Text-fig. 170) in material seen, but gills might be more complex in other specimens. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to about 10th–12th row of hooks. Posterior circlet with about 66 rows of 9–12 hooks.

MATERIAL EXAMINED. From Nyasaland. No West African material has been seen.

Larval habitat and range. Pupae of this species occur mainly in slow-moving water in streams attached principally to trailing grasses, and it may be inferred that this is the usual larval habitat. Widely distributed from Sudan to Transvaal and Bechuanaland, but also extending into West Africa. I have collected *mcmahoni* at a few localities in Northern Nigeria in the pupal stage, but did not obtain larvae.

Simulium cervicornutum Pomeroy

Type form. Closely similar to *unicornutum*.

Length. Mature larva, 4·5 mm.

Head. Head capsule with very distinct negative pattern (Text-fig. 17), a lyre-shaped brown pigmented area on the cephalic apotome surrounding the pale head-spots, and reaching the cleavage line (cf. *unicornutum*) medio-laterally ; sides of the head capsule infuscated behind and above eye-spots, but with usual clear eyebrow stripe ; ground colour creamy-white, pigmentation usually strongly marked but occasionally indistinct. Postgenal cleft large and rounded (Text-fig. 34), lateral margins slightly curved and apical margin evenly rounded without the distinct angle of *unicornutum* ; postgenal bridge shorter than hypostomium. Hypostomium (Text-fig. 54) with usual row of 9 apical teeth, median and corner teeth moderately prominent (less so than in *unicornutum*) and intermediate teeth of equal size forming an even row ; 5–6 lateral serrations, the hindmost serrations usually blunt and lying well posterior to first hypostomial seta ; hypostomial setae 3–4 in each row, lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta distinctly shorter than that between corner teeth. Antenna (Text-fig. 74) short, only slightly longer than stem of cephalic fan, unpigmented, first segment 4·5–5 times as long as broad, segment length ratios 3 : 3·7 : 3. Mandible of typical form, posterior serration present, small (Text-fig. 109), second comb tooth much smaller than first and as long as third. Maxillary palp about 2·75 times as long as breadth at base (Text-fig. 121). Cephalic fan with about 36 rays.

Thorax. Milky or greyish-white with dark grey or greyish-brown marking ; cuticle dorsally and dorso-laterally with numerous minute colourless hairs as in *mcmahoni* and *unicornutum*. Proleg circlet with about 25 rows of 4–5 hooks ; lateral plate unpigmented, with about 9 processes. Pupal respiratory histoblast with 9 stout wrinkled branches, of which 5 are visible without dissection (Text-fig. 179) and comprise two straight branches anteriorly and three S-shaped branches posteriorly.

Abdomen. Shaped as in Text-fig. 7 ; pale grey or greyish-white with black or brown segmental mottling, milky-white ventro-apically. Ventral papillae present, small and obtuse or slightly rounded apically. Cuticle of posterior segments dorsally and dorso-laterally with numerous large scattered black scales, the scales strongly serrate apically (Text-fig. 142) ; cuticle on dorsum of anterior segments with a few minute pale hairs as on the thorax. Last abdominal segment just anterior to posterior circlet laterally with a small black sclerite as in *unicornutum* (Text-fig. 155), the sclerite sometimes divided into two or three parts and occasionally inconspicuous but traces at least always present. Rectal scales present. Rectal gills with 7–10 secondary lobules on each lobe, lobules usually fewer on the median lobe than on the lateral lobes. Anal sclerite of usual form, strongly sclerotized but usually with an unsclerotized break in the median line (Text-fig. 162), posterior arm extending to 10th–13th row of hooks. Posterior circlet with about 60–67 rows of 10–14 hooks.

MATERIAL EXAMINED. From Northern Nigeria, Liberia, Sierra Leone, Uganda.

LARVAL HABITAT AND RANGE. Larvae of this species tolerate very varied conditions, and are found in very large rivers as well as in very small streamlets, both in slowly-moving and swift turbulent water. In small slow streams larvae are most commonly found on dead leaves or recently-fallen leaves, often in company with the larvae of *alcocki* and *unicornutum* ; in the rapids of large rivers the larvae occur mostly on blades of trailing grass or on sticks and corn-stalks lodged among rocks, and in these situations may be found among larvae of *damnosum* and *bovis*. Common and widely distributed from Sierra Leone to Southern Africa in both forested and savannah areas.

Simulium unicornutum Pomeroy

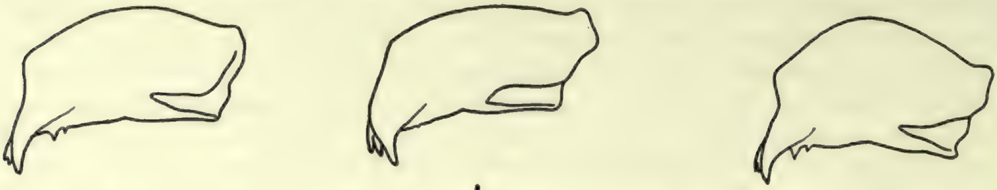
Type form. Closely similar to *cervicornutum*, but distinguishable by the form of the postgenal cleft.

Length. Mature larva, 4·5–4·75 mm.

Head. Head capsule pale yellowish or creamy-white with negative pattern (Text-fig. 18), the dark pigmentation round the pale antero- and postero-median spots forming an H-shaped or slightly lyre-shaped mark on the cephalic apotome, the infuscation usually less extensive laterally than in *cervicornutum* so that the lateral head-spots are not clearly demarcated ; degree of pigmentation variable but often intensively marked, the ventro-lateral aspects of the head capsule usually strongly infuscated dark brown. Postgenal cleft large and mitre-shaped (Text-fig. 35), distinctly angulate apically and more parallel-sided than in *cervicornutum* ; postgenal bridge much shorter than hypostomium. Hypostomium (Text-fig. 55) with usual row of 9 apical teeth, median and corner teeth strongly prominent, intermediate teeth well developed and subequal in size ; 6–7 lateral serrations with the hindmost serration lying posterior to first hypostomial seta ; hypostomial setae 3–4 in each row, lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta slightly less than or subequal to that between corner teeth. Antenna (Text-fig. 76) short, almost unpigmented, first segment about 6 times as long as broad, segment length ratios 12 : 13 : 13. Mandible of typical form, posterior serration present, small (Text-fig. 92), second comb tooth much smaller than first and shorter than third. Maxillary palp about 3 times as long as breadth at base (Text-fig. 122). Cephalic fan with 37–41 rays.

Thorax. Pale grey or yellowish-grey with dark or brownish-grey banding ; cuticle dorsally and dorso-laterally with minute colourless hairs. Proleg circlet with about 21–24 rows of 5–7 hooks ; lateral plate very lightly pigmented, with about 9 processes. Pupal respiratory histoblast formed by two very large strongly wrinkled lobes, the anterior lobe simple and the posterior lobe recurved upon itself (Text-fig. 180).

Abdomen. Shaped as in Text-fig. 7 ; pale grey or yellowish-white with boldly



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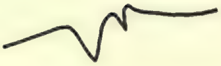

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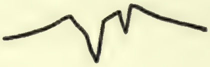

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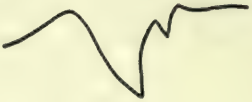

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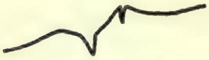

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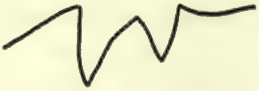

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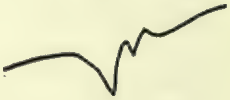

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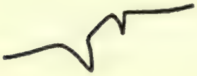

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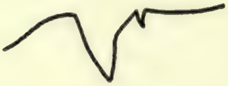

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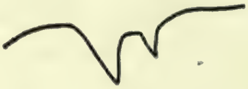

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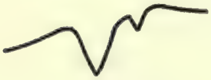

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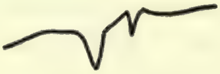

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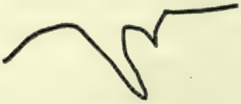

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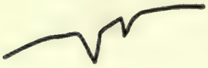

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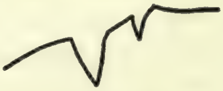

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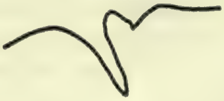

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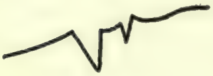

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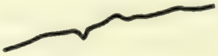

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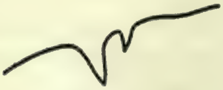

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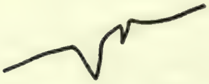

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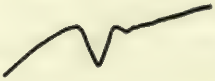

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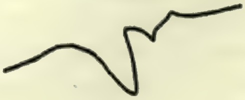

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marked black, dark brownish-grey or grey segmental mottling, milky-white ventro-apically. Ventral papillae present, slightly rounded apically. Cuticle of posterior segments dorsally and dorso-laterally with numerous large scattered scales, the scales black, strongly sclerotized, and deeply serrate apically (Text-fig. 143); cuticle of anterior and posterior segments with numerous minute colourless hairs, those on the posterior segments among the scales. Last abdominal segment just anterior to posterior circlet laterally with a small black sclerite (Text-fig. 155), the sclerotization sometimes developed in two or three slightly separated parts. Rectal scales present. Rectal gills with finger-like secondary lobules, 8–12 in each lateral lobe and 6–10 in median lobe. Anal sclerite of usual form, strongly sclerotized but usually unsclerotized in fine median line (Text-fig. 161), posterior arm extending to 9th–11th row of hooks. Posterior circlet with about 63 rows of 9–13 hooks.

MATERIAL EXAMINED. From Northern Nigeria, Sierra Leone, Uganda, Nyasaland.

LARVAL HABITAT AND RANGE. Like *cervicornutum* this species will tolerate both swift and slowly-flowing rivers and streams, but has a very strong preference for slowly-moving, often heavily-shaded, streams where the larvae are found on dead leaves, pebbles, etc. in company with those of *alcocki*, *cervicornutum*, *johannae*, *schoutedeni* and other slow-stream species. In small swift rocky streams it sometimes occurs with *medusaeforme* form *hargreavesi*, and occasional larvae may be found amongst those of *damnosum* in larger turbulent rivers. Common and widely distributed over more or less the whole Ethiopian Region.

Simulium unicornutum form ***palmeri*** Pomeroy

A larva collected with pupae of this form (from Southern Cameroons) and presumably of *palmeri* is indistinguishable from the type form. The pupal respiratory histoblast is not however developed, but it may be assumed that the lobes of the gill-spot show slight constrictions at intervals as in the respiratory organ of the pupa.

[***Simulium unicornutum*** form ***blacklocki*** Edwards

This pupal form is only known from the type locality in Sierra Leone, and the larva is unknown. If it is genuinely a form of *unicornutum* the larva will probably show almost identical characteristics to the type form except in the formation of the "gill-spot". The habitat is likely to be slow streams.]

FIGS. 90–111. (90) Shape of mandible of (*a*) the majority of species; (*b*) *S. berneri* with base of apical tooth very broad; (*c*) *S. dentulosum* with outer margin strongly arched. (91–111) mandibular serrations of (91) *S. alcocki*; (92) *S. unicornutum*; (93) *S. dentulosum*; (94) *S. johannae*; (95) *S. ruficorne*; (96) *S. loutetense*; (97) *S. schoutedeni*; (98) *S. aureosimile*; (99) *S. medusaeforme hargreavesi*; (100) *S. impukane*; (101) *S. hirsutum*; (103) *S. vorax*; (102) *S. kenyae*; (104) *S. adersi*; (105) *S. colas-belcouri*; (106) *S. mcmahoni*; (107) *S. berneri*; (108) *S. bovis*; (109) *S. cervicornutum*; (110) *S. griseicolle*; (111) *S. damnosum*.

Simulium ruficorne Macquart

The *ruficorne*-group is distinguished by having ventral papillae ***and*** a positive head pattern. *S. ruficorne* is distinguished from *aureosimile* by the absence of antero-lateral head-spots.

Length. Mature larva, 6–6·5 mm.

Head. Head capsule with boldly marked positive pattern of dark brown spots on creamy-yellow ground colour, the spots themselves surrounded by narrow yellow-brown infuscation (Text-fig. 20). Cephalic apotome with antero- and postero-median, and postero-lateral head-spots, but antero-lateral spots *absent* or with only the very faintest traces visible ; head capsule laterally with dark spots as in Text-fig. 20, and dark infuscation round the eye-spots ; usual pale eyebrow stripe present. Postgenal cleft very small (Text-fig. 36), slightly broader anteriorly than posteriorly and with apical margin slightly rounded, a little less subquadrate than in *aureosimile* ; postgenal bridge a little longer than hypostomium. Hypostomium (Text-fig. 56) with usual row of 9 apical teeth, median and corner teeth very strongly developed, and median one of intermediate teeth very small and much shorter than other intermediate teeth ; 5–8 lateral serrations (usually 6 or 7), serrations strongly developed, with hindmost serration lying well posterior to first hypostomial seta ; hypostomial setae 3–5 in each row, lying parallel to lateral margin of hypostomium, hindmost seta sometimes widely separated from other setae ; distance between apex of corner tooth and first hypostomial seta distinctly less than that between corner teeth. Antenna (Text-fig. 77) long, lightly pigmented, first segment about 6 times as long as broad, segment length ratios 10 : 8·7 : 11. Mandible of typical form, serrations (Text-fig. 95) unusual, the posterior serration large and broad at the base, not much smaller than anterior serration, second comb tooth about equal in length to third and much smaller than first. Maxillary palp unusually long, about 3·5–3·6 times as long as breadth at base (Text-fig. 123). Cephalic fan with 35–42 rays (56 rays seen in mature larva from desert oasis, Sinai).

Thorax. Milky or creamy-white with pale grey-brown marking ; cuticle bare. Proleg circlet with about 23–27 rows of 5–7 hooks ; lateral plate unpigmented, with about 16 processes. Pupal respiratory histoblast with 4 large wrinkled tubular filaments, curled round so that their apices are directed upwards (Text-fig. 181).

Abdomen. Shaped as in Text-figs. 7 and 11 ; pale yellowish-white with traces of pale brown segmental mottling (never seen with very dark banding), milky-white ventro-apically. Ventral papillae present (Text-fig. 156), large and usually strongly pointed conical in shape. Cuticle apparently completely bare, without scales or spines, but with minute colourless hairs dorsally on the posterior segments particularly around the anal sclerite (Text-fig. 144). Rectal scales present. Rectal gills variable, often simpler than in most species, each lobe sometimes without secondary lobules ; small thumb-like secondary lobules sometimes present, 2–4 on each lobe ; some specimens with 6–7 finger-like secondary lobules on each lobe. Anal sclerite of usual form, strongly sclerotized, anterior arms sometimes rather short and broad, posterior arm extending to 10th or 11th row of hooks. Posterior circlet with about 63 rows of 9–13 hooks.

MATERIAL EXAMINED. From Northern Nigeria, Uganda, Egypt.

LARVAL HABITAT AND RANGE. Larvae live on trailing grasses, leaves, pebbles, or rocky beds in very slowly-moving water, usually in small streams, occasionally in larger rivers. Immature stages may often be found in situations where almost no flow exists, and even at times in stagnant water (for example in the marshy fadamas of the drier parts of Northern Nigeria) ; this habitat often contains much algal growth, and larvae are often covered with organic matter. Larvae usually occur in masses of the one species, and are rarely associated with other species since these cannot tolerate the conditions favoured by *ruficorne*. Common throughout Africa, including Algeria, Egypt, Morocco, and islands of the Malagasy sub-region, extending into the desert areas on the fringes of the Sahara.

Simulium aureosimile Pomeroy

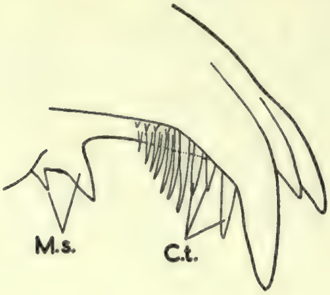
Similar to *ruficorne* but readily distinguished by the presence of well-marked antero-lateral head-spots.

Length. Mature Larva, 5·75–6·5 mm.

Head. Creamy-yellow with very distinct positive pattern of brown head-spots, with areas of yellow-brown infuscation around the spots (Text-fig. 19) ; cephalic apotome with all groups of head-spots well developed including antero-lateral spots (cf. *ruficorne*) ; sides of head capsule with dark spots and infuscation round eye-spots as in Text-fig. 19, eyebrow stripe present but narrow and not very distinct ; pigmentation less variable than in most species and head-spots always distinct. Postgenal cleft small and subquadrate (Text-fig. 37), more truncate and less rounded apically than in *ruficorne* ; postgenal bridge long, about 1·5 times as long as hypostomium. Hypostomium (Text-fig. 59) with usual row of 9 apical teeth, median and corner teeth short and blunt (cf. *ruficorne*), corner teeth very broad basally, intermediate teeth subequal in size or middle one very slightly smaller than other intermediate teeth ; 6–9 lateral serrations (usually 7–8), the serrations small and blunt, not strongly developed as in *ruficorne*, with hindmost serration lying posterior to first hypostomial seta ; hypostomial setae 5–7 in each row, the hindmost seta well separated from the other setae as in some specimens of *ruficorne*, setae lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta distinctly less than that between corner teeth. Antenna (Text-fig. 78) very long, very lightly pigmented, first segment about 7·5 times as long as broad, segment length ratios 7·6 : 9 : 6·6. Mandible of typical form, posterior serration present, very small (Text-fig. 98), second comb tooth as long as or very slightly longer than third, much smaller than first. Maxillary palp unusually long, about 3·8 times as long as breadth at base (Text-fig. 124). Cephalic fan with 51–60 rays (cf. *ruficorne*), usually 53–56.

Thorax. Greyish-white with only very faint darker marking ; cuticle bare. Proleg circlet with about 30 rows of 6–10 hooks ; lateral plate lightly pigmented, with about 13–16 processes. Pupal respiratory histoblast with 4 long wrinkled tubular filaments, longer and more coiled than in *ruficorne*, with the apices directed caudad (Text-fig. 182).

Abdomen. Shaped as in Text-fig. 7 ; pale grey or greyish-white, with only faintly



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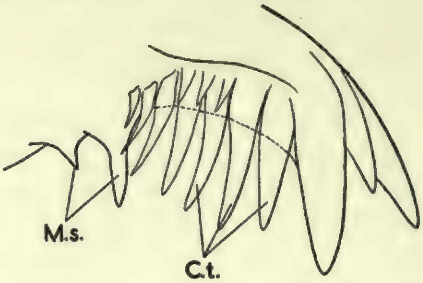

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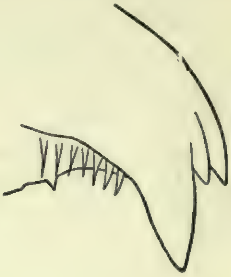

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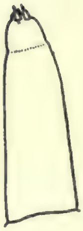

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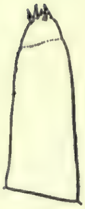

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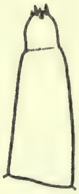

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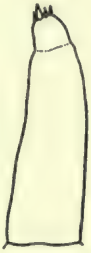

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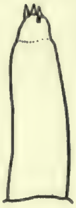

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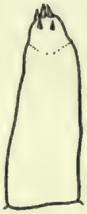

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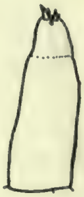

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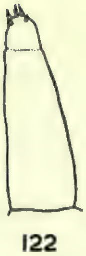

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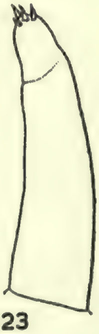

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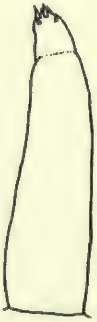

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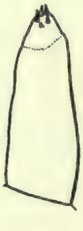

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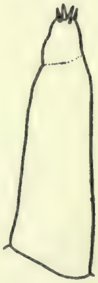

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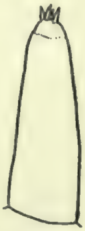

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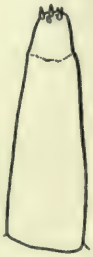

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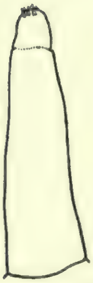

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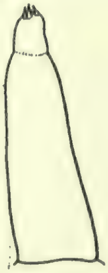

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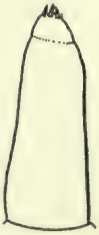

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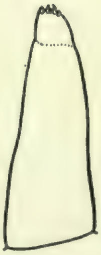

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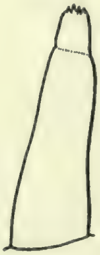

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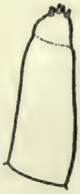

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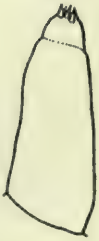

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indicated darker segmental mottling so that the whole body appears pale grey, milky-white ventro-apically; ventral nerve-cord grey, very distinct. Ventral papillae present, large and rather pointed. Cuticle apparently completely bare, without scales or spines, but with a few minute colourless hairs postero-dorsally particularly near the anal sclerite (as in *ruficorne*, Text-fig. 144). Last abdominal segment laterally just anterior to posterior circlet often (but not in all specimens) with very small dark sclerotizations, three or four in number lying one above the other (as in some specimens of *damnosum*), the sclerotizations not combined into such a definitive sclerite as in *unicornutum*. Rectal scales present. Rectal gills with numerous finger-like secondary lobules, 8–10 in median lobe and 10–12 in each lateral lobe. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to 12th–14th row of hooks. Posterior circlet with about 72 rows of 10–13 hooks.

MATERIAL EXAMINED. From Northern Nigeria (personally collected at Kaduna and Zaria). The above description is based on this material. Freeman & de Meillon (1953) have synonymized *brachium* Gibbins and *simplex* Gibbins with *aureosimile* Pom.: I have examined Gibbins' larvae (spirit material of *brachium* and 7 slides of *simplex*) and they show certain differences from the Nigerian material. The size is larger, length of mature larvae 7–8 mm., colour apparently darker grey (possibly discoloured), the cephalic fans have only 31–40 rays in mature larvae, and the anal gills are less complex, with 4–6 short secondary lobules per lobe; the gills in one specimen have however 10 lobules, but the gills are of course frequently very variable. Other characters, including the head markings, hypostomium, elongate maxillary palp, respiratory histoblast, etc. are identical with those of the Nigerian *aureosimile*. The differences mentioned probably lie within the natural variability of *aureosimile* and I think Gibbins' Uganda material and the Nigerian material may safely be regarded as conspecific.

LARVAL HABITAT AND RANGE. Larvae are found principally in swiftly-flowing, broken water, in small rivers and streams particularly where the water flows over boulders; larvae often occur in very large masses attached to grasses and stones. At Zaria, Northern Nigeria, larvae were found on the boulders laid down in a river as a vehicle-ford; in these artificially turbulent conditions *aureosimile* immature stages occurred in company with those of *medusaeforme* and *damnosum*. Known from many parts of Tropical Africa from Guinea to Nyasaland, but in South Africa its place is taken by the closely related *nigritarsis* Coquillet.

FIGS. 112–135. (112–114) Apex of mandible of (112) species of Division A (comb teeth small and second comb tooth usually shorter than first and third comb teeth); (113) most species of Division B (comb teeth large in an even row), drawn from *S. vorax*; (114) *S. berneri* (comb teeth and serrations very reduced). (115–135) Maxillary palp of (115) *S. alcocki*; (116) *S. johannae*; (117) *S. schoutedeni*; (118) *S. impukane*; (119) *S. mcmahoni*; (120) *S. kenyae*; (121) *S. cervicornutum*; (122) *S. unicornutum*; (123) *S. ruficorne*; (124) *S. aureosimile*; (125) *S. hirsutum*; (126) *S. adersi*; (127) *S. berneri*; (128) *S. griseicolle*; (129) *S. dentulosum*; (130) *S. loutetense*; (131) *S. medusaeforme hargreavesi*; (132) *S. vorax*; (133) *S. colas-belcouri*; (134) *S. bovis*; (135) *S. damnosum*. *M.s.* = mandibular serrations; *C.t.* = comb teeth.

Simulium hirsutum Pomeroy

Type form. Closely similar to *adersi*, and difficult to distinguish reliably; in the limited material seen the hypostomial teeth are weaker, the maxillary palp shorter and the antenna longer than in *adersi*, and the head capsule is devoid of even faint pigmentation. These differences may not be constant.

Length. Mature larva, 5–5·5 mm.

Head. Head capsule pale yellow or creamy-yellow, without pigmentation in material seen but a weak negative pattern similar to that in *adersi* probably occurs in some specimens. Postgenal cleft large and rounded, similar to *adersi* (Text-fig. 38), very slightly angulate apically; postgenal bridge a little shorter than hypostomium. Hypostomium (Text-fig. 58) with usual row of 9 apical teeth, median and corner teeth little developed, less prominent than in *adersi*, intermediate teeth subequal in size forming a more or less even row; 5–6 small lateral serrations, with hindmost serration lying on level with or a little anterior to first hypostomial seta; hypostomial setae 4 in each row, lying parallel to lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta subequal to or a little less than that between corner teeth. Antenna (Text-fig. 80) long, very lightly pigmented, first segment about 7·5 times as long as broad, segment length ratios 12·3 : 11 : 11. Mandible of typical form, posterior serration present, small (Text-fig. 101), second comb tooth much smaller than first and subequal in size to third. Maxillary palp short, about 2·8 times as long as breadth at base (Text-fig. 125). Cephalic fan with about 30–34 rays.

Thorax. Pale yellowish-white with only faint traces of darker marking; cuticle bare. Proleg circlet with (?) about 30 rows of 6–10 hooks; lateral plate almost unpigmented, with about 15 processes. Pupal respiratory histoblast with 8 long thin tightly coiled filaments arising in three pairs, two filaments dividing again more apically; shape of " gill-spot " (Text-fig. 183) less regularly oval than in *adersi*.

Abdomen. Shaped as in Text-fig. 7; pale yellowish-white with little trace of darker segmental mottling, milky-white ventro-apically (Gibbins (1936) gives general colour pale grey). Ventral papillae present. Cuticle of posterior segments dorsally with small scattered simple setae (Text-fig. 145). Rectal scales present. Rectal gills seen only in single specimen in which the median lobe is simple and each lateral lobe bears one small thumb-like secondary lobule (the specimen figured by Gibbins (1936)), but gills are probably somewhat variable as in most species. Anal sclerite of usual form, strongly sclerotized but not in the median line, posterior arm extending to about 12th or 13th row of hooks. Posterior circlet with about 76–80 rows of 8–15 hooks (Gibbins gives about 104 rows but there are fewer than this in his slide material in B.M. collection).

MATERIAL EXAMINED. Only two larvae in poor condition together with some fragments from Uganda have been available for study, and no West African material has been seen. These larvae were Gibbins' material, one in spirit and the other with the fragments on slides; remounts have been made where necessary, but it should be noted that the above description has been drawn up from limited and imperfect material, and that slight discrepancies may appear when larvae from West Africa are known.

LARVAL HABITAT AND RANGE. Immature stages are found on trailing grasses and stones, principally in broken swiftly-flowing water in streams. Gibbins (1936) records the larvae living under cascades in association with *cervicornutum*. In Nigeria I have found the pupae amongst those of *kenyae* in turbulent rocky streams. Widely distributed in the Ethiopian Region from Sierra Leone to Natal.

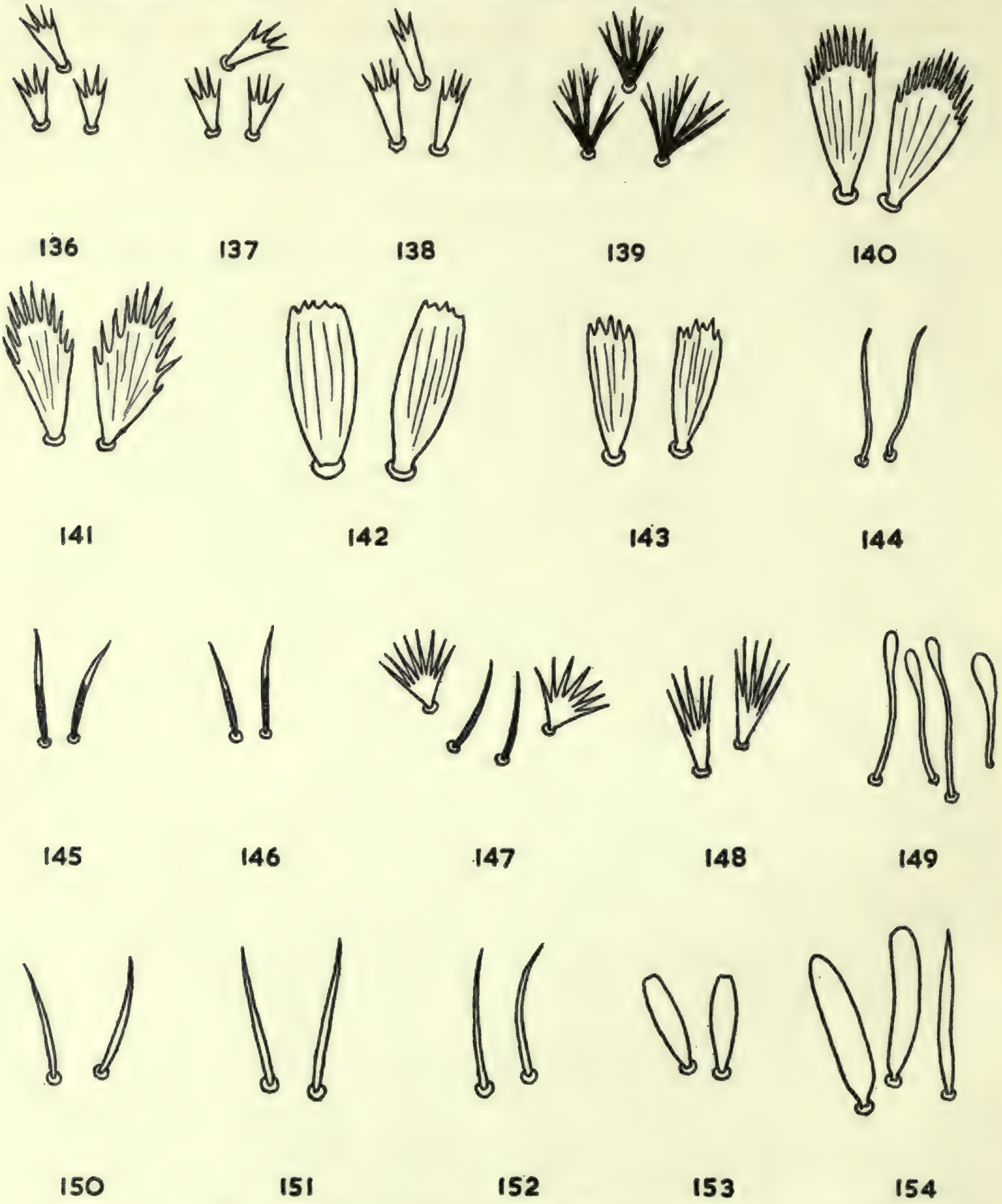
Simulium adersi Pomeroy

Length. Mature larva, 4·5–5 mm. (5·5–6 mm. in larvae from Nsadzi Island, Lake Victoria ; Gibbins' material described in Gibbins (1934)).

Head. Head capsule creamy-yellow, pale yellow or fulvous with negative pattern, the cephalic apotome with a yellow-brown H-shaped or lyre-shaped pigmented area (Text-fig. 21), pale postero-median head-spots usually distinct but other head-spots not clearly defined ; lateral areas of the head unpigmented, or with the usual 3-shaped pigmented area behind the eye-spots (Text-fig. 21). Postgenal cleft large and subcircular or very slightly cordate (Text-fig. 38), not perfectly rounded apically but with trace of widely obtuse angle ; postgenal bridge distinctly shorter than hypostomium. Hypostomium (Text-fig. 57) with usual row of 9 apical teeth, median and corner teeth strongly prominent, intermediate teeth well developed subequal in size or with median one slightly smaller than the others ; 5–8 lateral serrations (usually 7), the serrations often strong and the strongly sclerotized anterior serration sometimes very strongly developed and directed slightly outwards, hindmost serration lying posterior to or level with first hypostomial seta ; hypostomial setae 3–5 (usually 4) in each row, lying parallel to lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta slightly less than that between corner teeth. Antenna (Text-fig. 79) of moderate length (only slightly longer than stem of cephalic fan), very lightly pigmented, first segment about 6 times as long as broad, segment length ratios 8 : 10 : 10·3. Mandible of typical form, posterior serration present, small (Text-fig. 104), second comb tooth much smaller than first, about equal in size to third, first comb tooth very enlarged in some specimens seen. Maxillary palp long, about 3·1 times as long as breadth at base (Text-fig. 126). Cephalic fan with 38–47 rays, usually about 44 (Gibbins (1934) gives 28–32, but examination of his Nsadzi, Lake Victoria, material shows that mature larvae have 38–41 rays).

Thorax. Greyish or pale yellowish-white with pale greyish-brown marking ; cuticle bare. Proleg circlet with about 25 rows of 4–7 hooks ; lateral plate unpigmented, with about 15 processes. Pupal respiratory histoblast with 11 long thin tightly coiled filaments, outline of the organ sub-oval (Text-fig. 184).

Abdomen. Shaped as in Text-fig. 7 ; greyish or yellowish-white with darker brownish segmental mottling, sometimes faint, milky-white ventro-apically. Ventral papillae present, small (Text-fig. 157) and sometimes difficult to see (papillae are absent in Gibbins' material from Nsadzi Island). Cuticle of posterior segments dorsally with very numerous small simple setae, the setae slightly broadened at the centre, black and strongly sclerotized basally but clear apically (Text-fig. 146). Rectal scales present. Rectal gills with several finger-like secondary lobules in each lobe, but only seen fully extruded in one specimen in which the median lobe



FIGS. 136–154. Setae or scales of abdominal cuticle of (136) *S. alcocki* ; (137) *S. johannae;* (138) *S. impukane* ; (139) *S. kenyae* ; (140) *S. schoutedeni* ; (141) *S. mcmahoni* ; (142) *S. cervicornutum* ; (143) *S. unicornutum* ; (144) *S. ruficorne*, few setae of kind shown present only around anal sclerite, as also in *aureosimile* ; (145) *S. hirsutum* ; (146) *S. adersi* ; (147) *S. griseicolle* ; (148) *S. griseicolle*, scales on area of anal sclerite ; (149) *S. berneri*, short broad seta illustrated on right is the form seen on dorsum of thorax ; (150) *S. medusaeforme* ; (151) *S. vorax* ; (152) *S. colas-belcouri*, (153) *S. bovis* ; (154) *S. damnosum*, narrow pointed scale is the form seen on proleg.

has 7 lobules and each lateral lobe 8 lobules. Anal sclerite of usual form (Text-fig. 164), strongly sclerotized, anterior arms sometimes a little shorter and posterior arms a little broader than usual, posterior arm extending to about 11th–13th row of hooks. Posterior circlet with about 69–75 rows of 9–15 hooks (Gibbins (1934) gives about 120 rows of 19–25 hooks in his description of the larva from Nsadzi Island).

MATERIAL EXAMINED. From Northern Nigeria, Sudan and Nyasaland; the description above is based on the Nigerian material. I have also examined Gibbins' slides and spirit material of *adersi* collected by him from the rocky shore of Nsadzi Island, Lake Victoria (see his 1934 paper, p. 61) and the larvae from this locality differ in several important respects from those of other areas. The larvae from Nsadzi are very large, the head capsule is very heavily pigmented, the hypostomial teeth are rather blunt, ventral papillae are absent, and the posterior circlet has a very large number of rows of hooks: the form of the postgenal cleft, the 11-filamented pupal respiratory histoblast, the simple abdominal setae, and other characters however are the same as those of *adersi* larvae from elsewhere. The larvae from Nsadzi are undoubtedly correctly associated with the pupae and adults from the same area (material in B.M. collection), and the structure of the pupa and male genitalia appears to be identical with *adersi* from other parts of Africa; however the absence of ventral papillae and large size give a very different impression from *adersi* larvae as known from elsewhere, and it is possible that a pair of sibling species exists. The high number of hooklet rows in the posterior circlet is perhaps a local adaptation to the unusual environment on Nsadzi Island where the larvae are subjected to wave action on an exposed rocky headland.

LARVAL HABITAT AND RANGE. Larvae tolerate very widely differing conditions and occur in large rivers as well as very small streams, both in slow water and in swift rapids, attached to grasses, leaves, sticks, corn-stalks, rocks and pebbles; in large rivers, especially in semi-arid areas such as the far north of Nigeria, *adersi* often occurs in large numbers unassociated with other species or occasionally in company with *damnosum*; in smaller streams it is also frequently found without other species but may occur with *medusaeforme*. At Man o' War Bay near Victoria in the Cameroons immature stages have been found on herbage attached to the piles of a wharf in brackish water where a small stream discharges into the sea. Widely distributed over most of the Ethiopian Region.

Simulium berneri Freeman

A remarkable species easily distinguished from all other known Ethiopian species by the form of the hypostomium (Text-fig. 68).

Length. Approximately 6 mm.

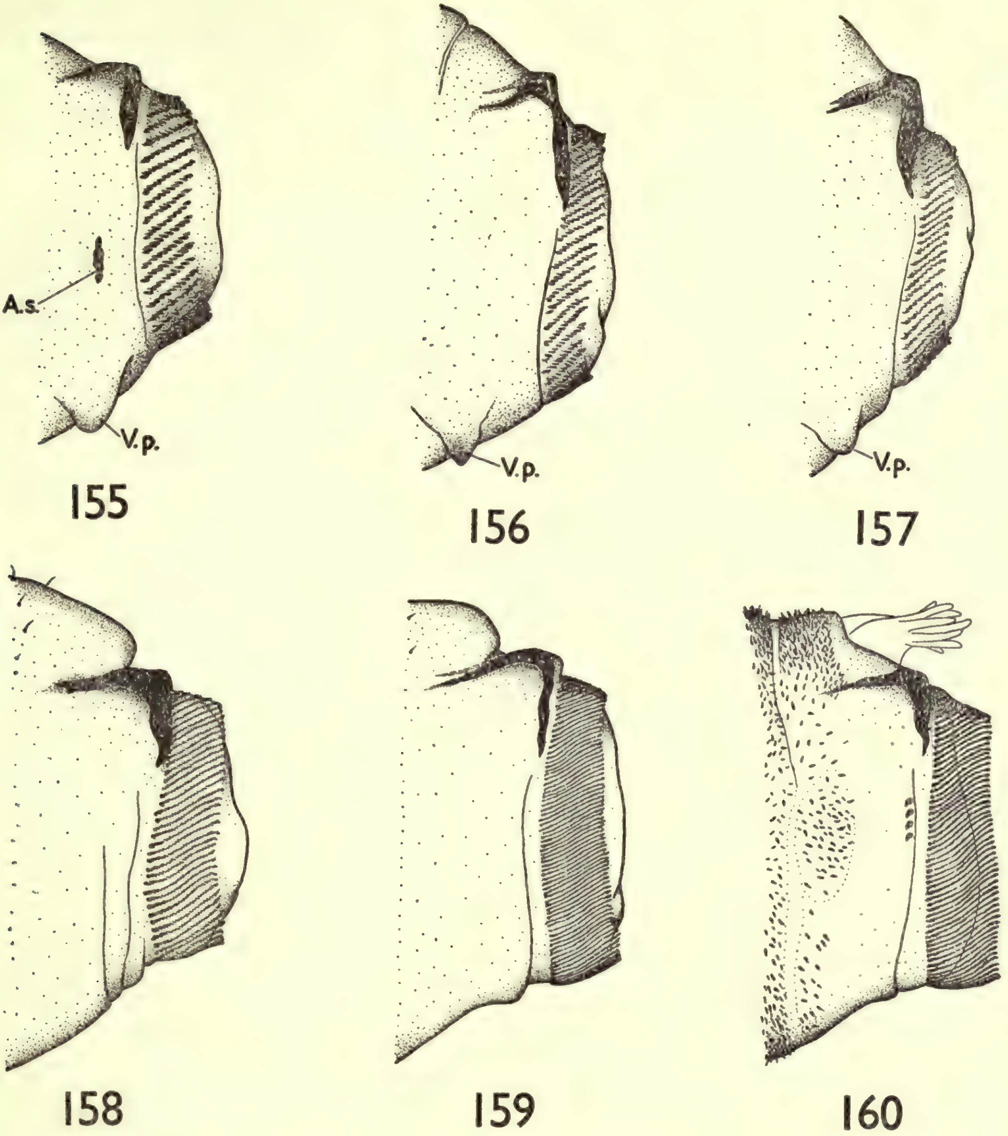
Head. Head capsule unusually long with traces of transverse wrinkling on the dorsum, eye-spots very small; without definite pattern, rather evenly pigmented yellow-brown with slightly more intense pigmentation medially on cephalic apotome. Postgenal cleft absent (Text-fig. 39), the ventral surface of the head capsule completely sclerotized or with only faint traces of a postgenal cleft, the postgenal bridge therefore very long and reaching the hind margin of the head. Hypostomium (Text-fig. 68) of extraordinary form, very heavily sclerotized apically with a large deeply sunk median tooth and 5 subequal blunt outwardly-curving teeth on either side ; lateral margins of median tooth slightly serrate ; lateral margins of hypostomium behind apical teeth smooth, non-serrate ; hypostomial setae very long and fine, 4–5 in each row, lying subparallel to lateral margin of hypostomium. Antenna (Text-fig. 81) short, lightly pigmented, first segment about 5 times as long as broad, segment length ratios approximately 5 : 6·4 : 6 (specimens seen are not completely matured and proportions in fully mature larvae may be slightly different). Mandible of unusual form (Text-fig. 90*b*) with the basal area of the large apical tooth very broad and the comb teeth very reduced (Text-fig. 114) ; serrations also very reduced, a small anterior serration present but posterior serration absent or possibly represented by a slight irregularity in the edge of the mandible (Text-fig. 107). Maxillary palp about 2·8 times as long as breadth at base (Text-fig. 127). Cephalic fan with 50 and 52 rays in almost mature specimen seen, rays narrower than in most species.

Thorax. Pale grey or greyish-yellow, without darker marking ; cuticle including that of proleg closely covered with pale elongate slightly clubbed hairs (Text-fig. 149), those on the dorsum shorter and more strongly spatulate than the other hairs. Proleg circlet with numerous hooks (invaginated and not possible to count in material seen). Pupal respiratory histoblast not seen, presumably with 38 very thin sinuous filaments, probably tightly coiled and arising near the base.

Abdomen. With the segmentation unusually clearly marked and the terminal segments distinctly demarcated from anterior segments ; pale grey or greyish-yellow, evenly coloured without darker segmental mottling. Ventral papillae absent. Entire cuticle densely covered with almost colourless long thin slightly clubbed hairs, sinuous and apparently very flexible, the alveoli very small but clearly present so that the hairs are modified macrotrichia. Rectal scales not seen, apparently absent. Rectal gills with several secondary lobules, one specimen seen with 8 finger-like secondary lobules in the median lobe, and 6 and 7 lobules on the lateral lobes. Anal sclerite unusual, arms very long and narrow only strongly sclerotized along the centre of each arm (Text-fig. 166), anterior arms rather strongly directed forwards, and in lateral view curved and slightly hook-like, posterior arm extending to about 26th–28th row of hooks ; position of anal sclerite distinctly postero-dorsal, not dorsal, so that it lies terminally on the abdomen with the posterior circlet occupying a ventro-apical position instead of the usual strictly apical position. Posterior circlet with about 96 rows of 14–21 hooks.

MATERIAL EXAMINED. Paratype larvae from Ghana.

LARVAL HABITAT AND RANGE. This is a striking and remarkable species in which the larvae and pupae live attached to mayfly nymphs of the genus *Elassoneuria* ; several of the larval characters closely resemble those of *S. copleyi* Gibbins and *S. lumbwanus* de Meillon in which the larvae are also found on mayfly nymphs. The head-capsule is elongate with traces of transverse wrinkling on the dorsum, the eye-spots are very reduced, the body segmentation is very distinct, and the posterior circlet occupies an oblique position ventro-posteriorly with the unusual anal sclerite in a terminal position. Some of these characteristics are no doubt



Figs. 155–160. Lateral view of terminal abdominal structures: 155–157, Division A species with ventral papillae and few rows of circlet hooks (155) *S. unicornutum*; (156) *S. ruficorne*; (157) *S. adersi*, ventral papilla small. 158–160, Division B species without ventral papillae and with very numerous rows of circlet hooks (158) *S. medusaeforme*; (159) *S. vorax*; (160) *S. damnosum*. *A.c.* = accessory sclerite; *V.p.* = ventral papilla.

adaptations to the specialized environment provided by the association with the mayfly nymphs, and are also found in the East African species (*neavei*-complex) which occur on crabs. At present *S. berneri* is known only from Ghana and Cameroons Republic, but it almost certainly exists in Nigeria also, and possibly elsewhere in West Africa.

Simulium griseicolle Becker

Type form.

Length. Mature larva, 4–4·25 mm.

Head. Head capsule pale, milky-white to creamy-yellow, without pigmentation. Postgenal cleft very large and subcircular (Text-fig. 40), similar in shape to *damnosum*; postgenal bridge short, distinctly shorter than hypostomium ; in some specimens the edges of the postgenal cleft are difficult to distinguish from the white membranous area filling the cleft, so that in spirit material the cleft may appear at first sight as though it is very reduced or absent and careful examination may be required. Hypostomium (Text-fig. 60) with usual row of 9 apical teeth, median and corner teeth strongly developed and rather prominent, intermediate teeth well developed and subequal in size ; anterior part of hypostomium back to second lateral serration rather strongly set off from rest of hypostomium ; 5–6 lateral serrations, hindmost serration weak, and anterior two serrations strongly developed and set off more clearly from the others than usual ; hindmost serration lying just posterior to or level with first hypostomial seta ; hypostomial setae 3–4 (usually 3) in each row, setae fine, lying subparallel to or slightly diverging posteriorly from lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta subequal to or a little less than that between corner teeth. Antenna (Text-fig. 82) short, unpigmented, first segment about 5·5–6 times as long as broad, segment length ratios 5 : 5·6 : 5. Mandible of typical form, only a single serration (Text-fig. 110), the posterior serration absent or represented only by a slight irregularity, second comb tooth almost as large as first and about equal in length to third. Maxillary palp about 3 times as long as breadth at base (Text-fig. 128). Cephalic fan with 26–34 rays.

Thorax. Milky or yellowish-white with very pale yellowish-brown darker banding ; cuticle dorsally and dorso-laterally closely covered with abundant setae, mostly simple, but with an admixture of a few compound fan-shaped setae (Text-fig. 147) ; cuticle ventrally and on proleg bare. Proleg normal (as pointed out by Freeman & de Meillon (1953), Gibbins (1935) was mistaken in stating that the proleg is peculiar with the circlet borne on a protuberance), circlet with approximately 17–20 rows of 3–6 hooks ; lateral plate unpigmented, with about 12 processes. Pupal respiratory histoblast with 3 flattened strongly wrinkled lobes, the median lobe lying inside the others with only the apex visible on external examination of the " gill-spot " (Text-fig. 185).

Abdomen. Shaped as in Text-fig. 7 ; milky or yellowish-white with darker yellowish-grey or very pale brownish segmental mottling, white ventro-apically. Ventral papillae absent. Cuticle closely covered, principally on the dorsum, with short simple setae and compound fan-shaped setae (Text-fig. 147), the fan-like scales sometimes very numerous on posterior segments, but sometimes restricted to last segment ; anterior segments usually without or with only a few fan setae but with abundant simple setae ; fan setae present on cuticle of apical surface enclosed by posterior circlet. Rectal scales present, but weakly sclerotized and difficult to see. Rectal gills with several finger-like secondary lobules, 4–8 in median lobe and 5–8 in each lateral lobe. Anal sclerite of usual form, strongly sclerotized, anterior arms short and broad basally and median area rather broad, posterior arm extending to about 10th row of hooks. Posterior circlet with about 66 rows of 9–14 hooks.

MATERIAL EXAMINED. From Northern Nigeria and Sudan.

LARVAL HABITAT AND RANGE. Larvae are found, often in large numbers, on sticks, dead grasses, sedge, corn-stalks, fish-traps and even on hard mud in smooth or only slightly broken but swift water. *S. griseicolle* favours very large rivers, such as the Nile and Niger, but breeding occurs also in smaller rivers, and in Northern Nigeria I have collected larvae in company with those of *bovis* and *adersi* in these smaller rivers and in company with *damnosum* in the Niger. The typical form ranges from Egypt and Sudan westwards to Northern Nigeria and south to the Congo and Uganda.

Simulium griseicolle form ***tridens*** Freeman & de Meillon

Larvae of this form are almost identical with the type form, but the fan-like scales are fewer in the material seen and restricted to the last abdominal segment ; some very large fan-like well sclerotized scales near anal sclerite (Text-fig. 148) ; in the pupal respiratory histoblast the innermost (median) of the 3 lobes is not externally visible (Text-fig. 186).

MATERIAL EXAMINED. From Northern Nigeria.

LARVAL HABITAT AND RANGE. Larvae occur in similar situations to those of the type form. Form *tridens* appears to be mainly West African (Nigeria and Ghana) but is known also from Nyasaland.

Simulium dentulosum Roubaud

Type form.

Length. Mature larva, 9–10·5 mm.

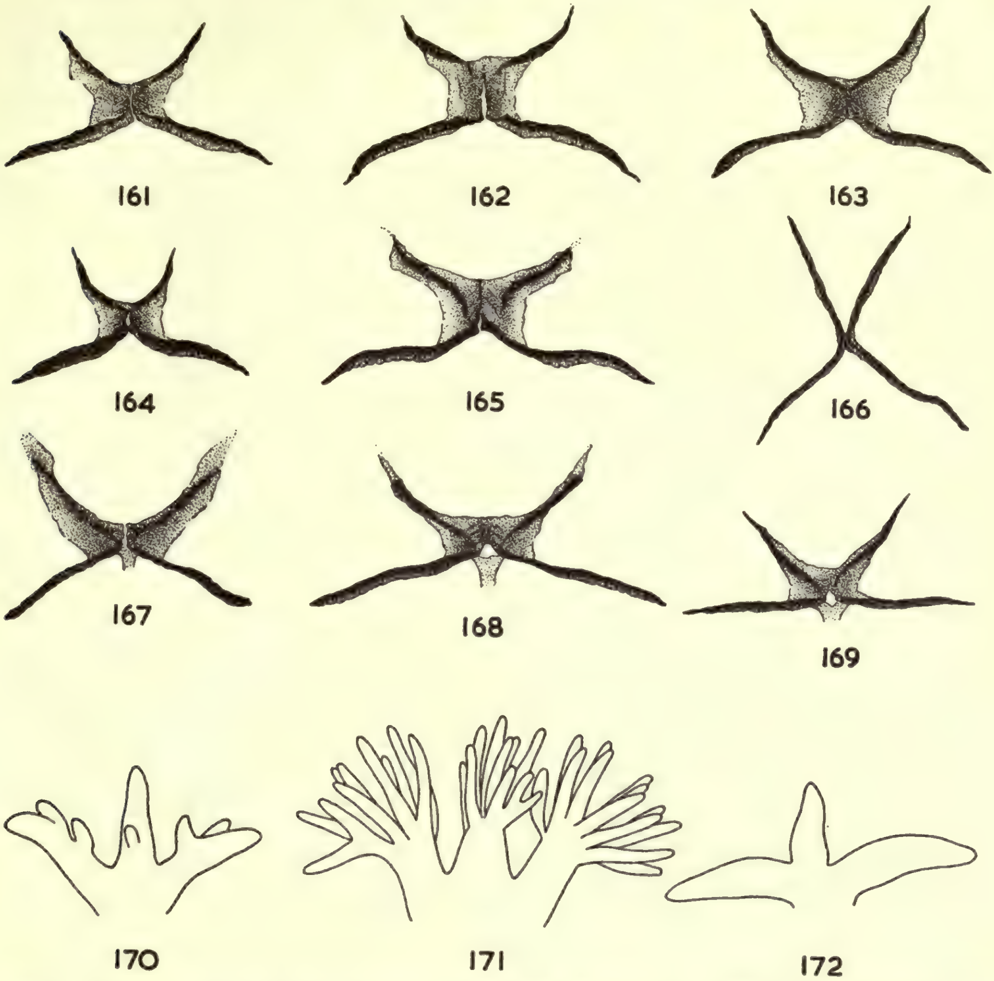
Head. Head capsule evenly suffused yellowish-brown with only small clear pale areas around eye-spots, narrow eye-brow stripes, and antero-laterally on cephalic apotome, but with a very distinct positive pattern in addition to general pigmentation (Text-fig. 22) ; pattern of cephalic apotome comprises very distinct brown antero-median and antero-lateral head-spots, less distinct postero-lateral and postero-median spots, the latter groups surrounded by dark suffusions on median and postero-lateral areas of cephalic apotome ; sides of head capsule with less distinct spots, but row of three small spots below and behind eye-spots and two large dark areas against the post-occiput usually distinguishable from general pigmentation. Lateral arms of cleavage line strongly convergent anteriorly so that cephalic apotome is a little more triangular in form than usual. Postgenal cleft very small, in some specimens almost absent, broader than long and truncate anteriorly (Text-fig. 41), or sometimes subtriangular and pointed apically (as figured by Grenier & Ovazza

(1956)); postgenal bridge very long, almost twice as long as hypostomium. Hypostomium (Text-fig. 61) with usual row of 9 apical teeth, median tooth slightly prominent, corner teeth broad and blunt, middle one of intermediate teeth slightly smaller than other intermediate teeth; 8–11 lateral serrations, the first 2 or 3 strongly sclerotized and lying behind corner teeth in usual way, other serrations small and blunt, formed only by slight incisions into antero-lateral margin of hypostomium, hindmost serration lying about level with or a little posterior to first hypostomial seta; hypostomial setae very numerous, but variable, 12–18 in each row, hindmost setae usually lying irregularly; setal rows diverging posteriorly from lateral margins of hypostomium, lateral areas of hypostomium outside the setae unusually broad; distance between apex of corner tooth and first hypostomial seta about two-thirds of that between corner teeth. Antenna (Text-fig. 84) long, first and third segments strongly pigmented dark brown, apex of second segment lightly pigmented, first segment about 6–6·5 times as long as broad but distinctly tapering apically, second segment long, segment length ratios 7·6 : 10 : 5. Mandible unusually broad with the outer margin strongly arched (Text-fig. 90*c*), posterior serration present, small, anterior serration broad basally as in most species (Text-fig. 93), not elongate as in *vorax*, comb teeth forming a fairly even row, the second comb tooth only slightly smaller than first. Maxillary palp long, about 3·3–3·4 times as long as breadth at base (Text-fig. 129). Cephalic fan with 54–70 rays.

Thorax. Fairly evenly dark grey or grey-black in not fully mature larvae, but mature larvae milky-white dorsally and laterally behind pupal respiratory histoblast; cuticle bare. Proleg circlet with about 40–50 rows of 8–13 hooks; lateral plate pigmented yellow-brown, with about 24–26 processes. Pupal respiratory histoblast (Text-fig. 187) with 14 tubular filaments, the filaments with black pointed tips mostly directed caudad.

Abdomen. Shaped as in *vorax* (Text-fig. 10), the segments gradually increasing in size to widest point and then contracting rather sharply to the posterior circlet; first 2 segments generally dark grey or blackish, other segments dark grey or grey-black above but milky-white ventrally and ventro-laterally; ventral nerve-cord distinct, dark grey. Ventral papillae absent. Cuticle apparently bare, without scales or setae, but with minute pale hairs (? microtrichia) dorsally, particularly on terminal segments and near anal sclerite. Faint traces of lateral sclerotization present just anterior to posterior circlet. Rectal scales present, very numerous. Rectal gills with 7–11 finger-like secondary lobules in each lobe, usually about 8 and median lobe usually with same number as lateral lobes; some mature specimens with only 5–6 lobules in each lobe, in which case one lobule is much larger than the others. Anal sclerite (Text-fig. 167) of usual form, strongly sclerotized, anterior arms with broad flange-like sclerotized areas posteriorly especially near the base, posterior arm extending to about 37th–40th row of hooks, and a small median sclerotized extension present posteriorly. Posterior circlet with about 220 rows of 24–39 hooks, most rows with 26–33 hooks (Gibbins (1934) gives 50–60 hooks per row but I have not seen this many even in Gibbins' own material).

MATERIAL EXAMINED. From Nyasaland, Uganda and Ruanda Urundi. No West African material has been seen, and *S. dentulosum* is at present only known from



FIGS. 161–172. (161–169) Anal sclerite of (161) *S. unicornutum* ; (162) *S. cervicornutum* ; (163) *S. impukane*; (164) *S. adersi*; (165) *S. ruficorne*; (166) *S. berneri*; (167) *S. dentulosum*; (168) *S. vorax* ; (169) *S. damnosum*. (170–172) Rectal gills of (170) larva with only a few thumb-like secondary lobules drawn from *S. mcmahoni* ; (171) larva with numerous long finger-like secondary lobules, drawn from *S. damnosum* ; (172) larva with simple trifid gill without secondary lobules, drawn from *S. impukane*.

two localities in West Africa (Bangan, Southern Cameroons, type locality of *S. gilvipes* Pomeroy, and Upper Volta). Gibbins' Uganda material has been examined and it may be mentioned here that his figure (Gibbins, 1934) of *dentulosum* mandible is incorrect : as already pointed out by Freeman & de Meillon (1953) Gibbins' drawings seem to have been made from whole mounts of larvae and consequently a distorted impression is given of some structures.

LARVAL HABITAT AND RANGE. Larvae live on grasses, sticks, stones, and rocks on the beds of streams, in very swiftly-flowing turbulent water, often in mountain torrents and cascades. *S. dentulosum* occurs from Upper Volta and the Cameroons to Abyssinia, Uganda and Kenya, and southwards as far as Cape Province, South Africa.

Simulium loutetense Grenier & Ovazza

Only three larvae have been seen, all slide material, and it is not possible to give coloration but dark segmental mottling is evident and the head capsule is lightly pigmented, rather as in *medusaeforme.*

Length. Mature larva, 5·5 mm.

Head. Head capsule probably light creamy-yellow in ground colour; with positive head pattern comprising distinct antero-median, postero-median and antero-lateral spots, without postero-lateral spots although cephalic apotome is moderately strongly pigmented in postero-lateral corners and behind postero-median head-spots (Text-fig. 23); sides of head capsule with dark spots behind and below eye-spots and with pigmented suffusions posteriorly against post-occiput, postero-ventrally, and antero-dorsally above and in front of eye-brow stripe. Postgenal cleft large and mitre-shaped (Text-fig. 42), somewhat similar to that of *medusaeforme*; postgenal bridge short, a little shorter than hypostomium. Hypostomium (Text-fig. 62) with usual row of 9 apical teeth, median tooth moderately strongly developed, corner teeth blunt and broad basally, intermediate teeth subequal in size; 4–7 small blunt lateral serrations, the serrations sometimes little more than rounded irregularities in margin of hypostomium, with hindmost serration lying a little anterior to first hypostomial seta; hypostomial setae 6–7 in each row, slightly diverging posteriorly from lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta about two-thirds of that between corner teeth. Antenna (Text-fig. 83) long, first and third segments lightly pigmented, first segment about 5 times as long as broad, segment length ratios 11 : 15·5 : 11. Mandible of typical form, posterior serration present, small (Text-fig. 96), the 3 comb teeth forming an evenly decreasing row. Maxillary palp long, about 3·2 times as long as breadth at base (Text-fig. 130). Cephalic fan with about 40 rays.

Thorax. Cuticle dorsally with minute colourless hairs. Proleg circlet with about 45 rows of 7–12 hooks; lateral plate strongly pigmented, with about 22 processes. Pupal respiratory histoblast with 6 thin tightly coiled filaments arising in pairs (Text-fig. 188).

Abdomen. Shaped as in Text-fig. 6; coloration probably similar to *dentulosum.* Ventral papillae absent. Cuticle dorsally with minute pale hairs, long and prominent around anal sclerite, but without scales or spines. Rectal scales present. Rectal gills not seen extruded, probably with several secondary lobules to each lobe. Anal sclerite of usual form, strongly sclerotized, posterior arm extending to 17th or 18th row of hooks. Posterior circlet with 70–80 rows of 13–16 hooks.

MATERIAL EXAMINED. Three larvae only seen (slide material) from Southern Cameroons and Sierra Leone.

LARVAL HABITAT AND RANGE. Immature stages occur on grasses and stones in swiftly-flowing turbulent water, mainly in streams; pupae have been collected in company with those of *colas-belcouri*. *S. loutetense* appears to be rare with a scattered distribution and is known from the Congo Republics, Sudan, Northern Rhodesia, Cameroons, Ghana and Sierra Leone; it is not known to me from East Africa.

Simulium medusaeforme form ***hargreavesi*** Gibbins

Length. Mature larva, 5·75–7 mm., usually about 6 mm.

Head. Head capsule creamy-white or pale yellow in ground colour with very variable yellow-brown or brown pigmentation and postive head pattern (Text-fig. 24); antero-median, antero-lateral, postero-median, and postero-lateral head-spots all present, but spots surrounded with dark infuscation so that the spots themselves are sometimes indistinct, postero-lateral spots sometimes almost absent; median and postero-median areas of cephalic apotome sometimes very strongly pigmented dark brown so that head-spots are almost invisible in the general infuscation; antero-lateral spots usually lying close to infuscated area between median groups of spots so that together they present a †-like mark; sides of head with row of three dark spots below and behind eye-spots and with usual dark pigmented areas posteriorly and postero-ventrally, eye-brow stripe distinct, strongly pigmented above and in front of eye-brow stripe. Postgenal cleft large, shaped as in Text-fig. 43; postgenal bridge short, distinctly shorter than hypostomium. Hypostomium (Text-fig. 63) with usual row of 9 apical teeth, the teeth broad and blunt, intermediate teeth subequal and median tooth slightly prominent; corner teeth very broad and hardly projecting beyond intermediate teeth; 4–6 (usually 5) lateral serrations, strongly acuminate, with hindmost serration lying a little anterior to first hypostomial seta; hypostomial setae 4–6 (usually 4) in each row, strongly diverging posteriorly from lateral edge of hypostomium; distance between apex of corner tooth and first hypostomial seta two-thirds or a little less than two-thirds of that between corner teeth. Antenna (Text-fig. 86) short, very little longer than stem of cephalic fan, very lightly pigmented, first segment about 4·5 times as long as broad, segment length ratios 5 : 6·8 : 4. Mandible of typical form, posterior serration present and moderately large (Text-fig. 99), comb teeth forming an even row of gradually decreasing size. Maxillary palp short, about 2·7 times as long as breadth at base (Text-fig. 131). Cephalic fan with 38–45 rays.

Thorax. Milky-white with dark grey marking; cuticle bare. Proleg circlet with about 35 rows of 9–12 hooks; lateral plate very lightly pigmented, with about 14 processes. Pupal respiratory histoblast with 6 stout wrinkled tubular filaments, the middle two arising from a common base, and numerous thin secondary filaments (Text-fig. 190).

Abdomen. Shaped as in Text-fig. 8; anterior segments dark grey, other segments dark grey dorsally and milky-white ventrally; some specimens with abdomen rather evenly coloured pale grey, others brownish-grey or sometimes almost black; ventral nerve-cord dark grey, distinct and contrasting sharply with white ventral surface. Ventral papillae absent. Cuticle dorsally on posterior segments with numerous simple setae (Text-fig. 150), the setae well sclerotized and often strongly curved. Rectal scales present, very numerous. Rectal gills with 5–8 finger-like secondary lobules in median lobe and 5–9 lobules in each lateral lobe, usually 6–8 in lateral lobes; in specimens with only 5 lobules one is usually larger than the others. Anal sclerite of usual form, strongly sclerotized, similar to *vorax* (Text-fig. 168) with slightly sclerotized median posterior projection, posterior arm extending to about 26th–30th row of hooks. Posterior circlet with about 140 rows of 18–30 hooks. (Gibbins (1934) in his description of *elgonense* Gibbins—synonym of *hargreavesi*—gives 40–45 hooks per row but I have not seen nearly as many as this in Gibbins' slide material, or more than 30 hooks per row in any of the material examined.)

MATERIAL EXAMINED. From Northern Nigeria, Sudan, S. Rhodesia and Uganda (including Gibbins' slides of *hargreavesi* and *elgonense*).

LARVAL HABITAT AND RANGE. Larvae are found in both large rivers and small streams, often in enormous numbers, attached to trailing grasses, dead leaves, sticks, stones and the solid rock surfaces forming the beds of watercourses particularly where there are cascades and turbulent foamy water; although swift broken water seems to be preferred the larvae are also found in slow streams. Frequently larvae and pupae of *hargreavesi* occur in almost pure masses of the one form in such numbers as to blacken the surfaces of rock to which they are attached. In small placid streams larvae may be found with those of *unicornutum*, and in swift rocky streams in company with *vorax* and *colas-belcouri*. In the rapids of larger rivers they may occur with *damnosum* and even *aureosimile* (as in the Galma River, Zaria, Northern Nigeria). Widely distributed from Sierra Leone to Natal.

Simulium medusaeforme Pomeroy, Type form

Larvae of the type form appear to be almost identical with form *hargreavesi* except in the structure of the pupal respiratory histoblast, which has only 5 stout branches with the middle one not forked as in *hargreavesi* (Text-fig. 191).

MATERIAL EXAMINED. From Uganda (Gibbins' slide material of *ugandae* Gibbins, synonym of *medusaeforme* type form).

LARVAL HABITAT AND RANGE. As in form *hargreavesi*.

Simulium vorax Pomeroy

Type form. Larvae closely similar to those of *colas-belcouri*.

Length. Mature larva, 7·75–9 mm.

Head. Head capsule strongly and rather evenly pigmented yellowish-brown to dark brown, usually pale only around eye-spots, on eye-brow stripes, and anteriorly on cephalic apotome (Text-fig. 25); degree of pigmentation somewhat variable; pattern of positive type but dark head-spots only very faintly distinguishable from surrounding pigmentation, although a series of small transversely elongate antero-median spots is usually evident (according to Gibbins (1939) the front without pigmented areas); lateral head-spots usually distinct from surrounding infuscation, occasionally head capsule below eye-spots only lightly pigmented and spots then only slightly darkened. Postgenal cleft subcordate in shape, of medium size (Text-fig. 44); postgenal bridge with a lightly pigmented longitudinal median area contrasting with dark pigmentation on either side (Text-fig. 44), a little shorter than hypostomium.

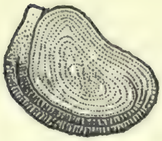
Hypostomium (Text-fig. 64) with usual row of 9 apical teeth, median tooth slightly prominent and other teeth broad and blunt, corner teeth very broad and only as long as or even a little shorter than intermediate teeth which are equal in size; 4–6 lateral serrations, the serrations very weak, with hindmost serration lying a little anterior to first hypostomial seta; hypostomial setae 7–10 in each row, strongly diverging posteriorly from lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta only half of that between corner teeth. Antenna (Text-fig. 85) short, only slightly longer than stem of cephalic fan, distinctly pigmented, first segment short only about 3·75–4 times as long as broad, segment length ratios 3·7 : 6 : 3·5. Mandible of typical form, small posterior serration present and anterior serration narrow and very elongate (Text-fig. 102), comb teeth very large and second comb tooth about equal in size to or even slightly longer than first and third comb teeth, the teeth only slightly shorter than large apical tooth (Text-fig. 113). Maxillary palp about 2·75 times as long as breadth at base. Cephalic fan with 50–60 rays, usually about 54–56 (Gibbins (1939) gives 40–50, but his material of *lepidum* de Meillon shows at least 50 rays).

Thorax. General colour grey except for milky-white histoblasts and general white area behind pupal respiratory histoblast in mature larvae; cuticle bare. Proleg circlet with about 45–50 rows of 9–15 hooks, most rows with about 12 hooks; lateral plate strongly pigmented yellowish-brown, with about 14 processes, the processes strong and not subdivided into smaller secondary processes in specimens seen. Pupal respiratory histoblast with 5 stout wrinkled primary branches (Text-fig. 192) and several thin secondary filaments not visible externally.

Abdomen. Gradually expanding posteriorly in lateral view to the widest, rather bulbous, point and then abruptly contracting to posterior circlet (Text-fig. 10); general colour pale to dark grey, milky-white ventro-apically, ventral nerve-cord grey. Ventral papillae absent. Cuticle dorsally on posterior segments with numerous scattered simple setae (Text-fig. 151). Some specimens with a row of small flattened scale-like accessory sclerotizations laterally on last abdominal segment in front of posterior circlet, the sclerotizations sometimes pale but in other larvae distinctly darkened. Rectal scales present, very numerous. Rectal gills with very variable number of secondary lobules, 13–18 very long narrow lobules in each lobe in Nigerian material seen, but only 6–7 lobules per lobe in Uganda material (Grenier, Hamon & Rickenbach (1955) give a total of 40–50 lobules in specimens from Upper Volta). Anal sclerite of usual form, arms very strongly sclerotized, with a median posterior prolongation and usually a triangular unsclerotized hollow between the base of this projection and the body of the sclerite (Text-fig. 168), posterior arm extending to about 40th–45th row of hooks. Posterior circlet with about 220 rows of 28–38 hooks.

MATERIAL EXAMINED. From Northern Nigeria and Uganda (Gibbins' slide material described as *lepidum* de Meillon by Gibbins (1939)).

LARVAL HABITAT AND RANGE. Larvae of *vorax* occur in very swift, turbulent foamy water in rocky streams and small rivers, often in tumbling mountain streams with waterfalls or cascades; larvae in such situations are usually abundant, attached to rock-surfaces under the water, stones, dead leaves, branches and other detritus lodged in the rapids. The immature stages are often mixed with those of *medusae-*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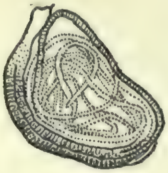
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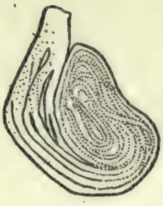
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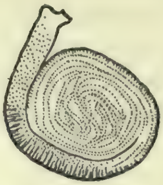
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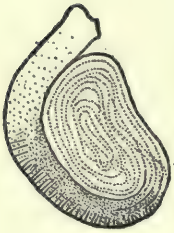
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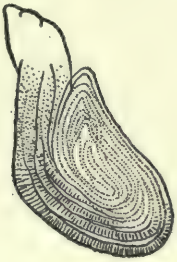
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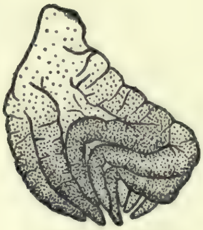
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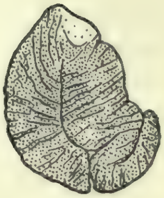
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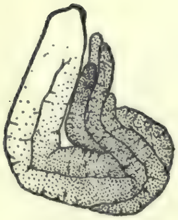
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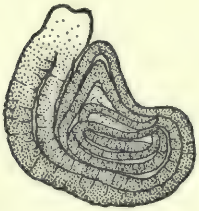
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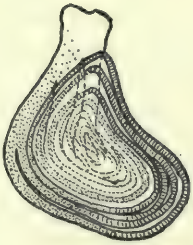
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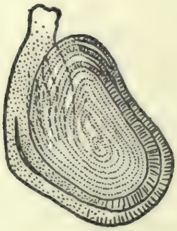
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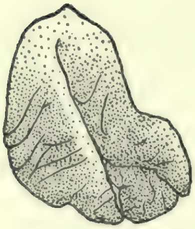
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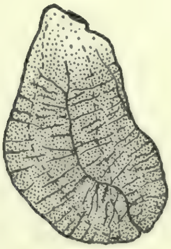
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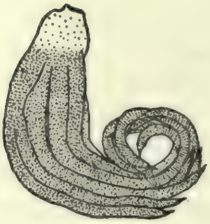
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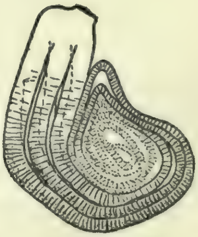
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forme hargreavesi and *colas-belcouri* which also favour places with dashing broken water. Distributed from Upper Volta eastwards to Tanganyika and south to South Africa.

Simulium colas-belcouri Grenier & Ovazza

Very similar to *vorax* and difficult to distinguish reliably except in fully mature larvae with the pupal respiratory histoblast darkened; the postgenal cleft appears to be consistently more pointed apically and less rounded, the median lightly pigmented area on the postgenal bridge is less evident, and the dark head-spots of the cephalic apotome are in most cases more distinct but the pigmentation of the head capsule is variable and not consistently different from *vorax*. The corner teeth of hypostomium are more pointed and the median tooth shorter than in *vorax* in specimens seen but this may not be a constant difference.

Length. Mature larva, 8–9·25 mm. (on average slightly larger than *vorax*).

Head. Head capsule heavily pigmented yellowish-brown to dark brown, pale around eye-spots, on eye-brow stripes and anteriorly and laterally on cephalic apotome (Text-fig. 26); positive pattern of usual groups of dark head-spots, the antero-median spots distinct but other head-spots indistinctly marked off from general pigmentation of posterior half of cephalic apotome; lateral head-spots sometimes distinct but occasionally not evident and in some specimens the head capsule is extensively pale below the eye-spots. Postgenal cleft pentagonal in shape (Text-fig. 45) and sharply angulate anteriorly, less heart-shaped than in *vorax*; postgenal bridge more or less evenly pigmented (without the distinct pale median longitudinal area which is present in *vorax*), shorter than hypostomium. Hypostommium (Text-fig. 65) with usual row of 9 apical teeth, the teeth forming a straight rather even row with the corner teeth broad and blunt, the intermediate teeth equal in size, and median tooth small and only slightly more prominent than other teeth; 2–4 very small blunt lateral serrations, the two strongly sclerotized serrations normally lying just posterior to corner tooth sometimes absent so that the ridge between corner tooth and first hypostomial seta is smooth, hindmost serration lying anterior to first hypostomial seta; hypostomial setae 7–8 in each row, strongly diverging posteriorly from lateral margin of hypostomium; distance between apex of corner tooth and first hypostomial seta only about three-fifths of that between corner teeth. Antenna (Text-fig. 87) short, only slightly longer than stem of cephalic fan, lightly pigmented, first segment about 4 times as long as broad, segment length ratios 7 : 12·3 : 7. Mandible of typical form, very small posterior serration present and anterior serration narrow and very elongate (Text-fig. 105) as in *vorax*, comb teeth very large and forming an even row as in *vorax* (Text-fig.

FIGS. 173–188. Pupal respiratory histoblast ("gill-spot") of mature larva of (173) *S. alcocki* type form; (174) *S. johannae*; (175) *S. impukane*; (176) *S. schoutedeni*; (177) *S. mcmahoni*; (178) *S. kenyae*; (179) *S. cervicornutum* type form; (180) *S. unicornutum* type form; (181) *S. ruficorne*; (182) *S. aureosimile*; (183) *S. hirsutum* type form; (184) *S. adersi*; (185) *S. griseicolle* type form; (186) *S. griseicolle* form *tridens*; (187) *S. dentulosum* type form; (188) *S. loutetense*.

113) (in the mandible figured by Grenier & Ovazza (1951) the apex of the elongate anterior serration is evidently broken off, and the serration appears truncate; I have seen specimens like this myself but it is clear that the anterior serration is naturally long and narrow as in most mandibles examined and as in *vorax*). Maxillary palp narrow, about 3–3·1 times as long as breadth at base (Text-fig. 133). Cephalic fan with about 57 rays (Grenier & Ovazza (1951) give 45–50).

Thorax. Generally grey with milky-white histoblasts; cuticle bare. Proleg circlet with about 52 rows of 8–13 hooks; lateral plate strongly pigmented yellowish-brown, with about 12–14 processes, the processes strong and not subdivided into weaker secondary processes. Pupal respiratory histoblast with 5 stout wrinkled branches (broader than in *vorax*) externally visible (Text-fig. 193) and 11 smaller wrinkled tubular filaments behind (total of 16 digitate filaments in respiratory organ).

Abdomen. Shaped as in *vorax* (Text-fig. 10); general colour grey with traces of darker segmental mottling, milky-white ventrally and ventro-apically, ventral nerve-cord grey. Ventral papillae absent. Cuticle dorsally on posterior segments with a few scattered simple setae (Text-fig. 152). No trace of lateral sclerotizations on last abdominal segment in material seen. Rectal scales present, very numerous. Rectal gills probably very variable, each lobe with 7–8 secondary lobules in material described by Grenier & Ovazza (1951), but in Nigerian material seen with gills partially extruded there is a principal lobule and 4 or 5 smaller lobules only to each lobe. Anal sclerite of usual form, strongly sclerotized, with a posterior median sclerotized prolongation as in *vorax* (Text-fig. 168), posterior arm extending to about 39th or 40th row of hooks. Posterior circlet with about 190–200 rows of about 30–49 hooks.

MATERIAL EXAMINED. From Northern Nigeria and French Congo.

LARVAL HABITAT AND RANGE. The habitat of *colas-belcouri* is the same as that of *vorax*, in swift foamy cascades, and the two species sometimes occur together. Larvae and pupae have been found in masses covering the lips of small waterfalls and in places where the water runs steeply down smooth rock inclines. In addition to *vorax* the larvae may be found in company with *medusaeforme hargreavesi* and *loutetense*. *S. colas-belcouri* is apparently rare, and is known to me only from French Congo, Sudan, and Northern and Eastern Nigeria.

Simulium bovis de Meillon

Length. Mature larva, 4·5 mm.

Head. Head capsule clear pale yellowish-white or creamy-white without pattern or pigmentation. Postgenal cleft very large and bulbous (Text-fig. 46), with a trace of a widely obtuse angle apically; postgenal bridge very short, much shorter than hypostomium. Hypostomium (Text-fig. 66) very broad with usual row of 9 apical teeth, the teeth blunt and broad basally and forming an almost even straight row, corner teeth only about as long as intermediate teeth, and median tooth only very slightly more prominent than other teeth; flattened lobe-like area behind each apical tooth unusually distinct; 3–5 very small, blunt, indistinct lateral serrations, with hindmost serration lying a little anterior to first hypostomial seta; hypostomial setae 4 in each row (occasionally very small fifth seta present), diverging posteriorly from lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta about half of that between corner teeth. Antenna (Text-fig. 88) short, only slightly longer than stem of cephalic fan, very lightly pigmented, first segment about 4–4·5 times as long as broad, segment length ratios 6 : 6·8 : 5·7. Maxillary palp short, about 2·7 times as long as breadth at base (Text-fig. 134). Cephalic fan with 34–45 rays.

Thorax. Generally milky-white, very pale ; cuticle bare. Proleg circlet with about 35–40 rows of 8–10 hooks ; lateral plate very lightly pigmented, with about 11–12 processes, the processes strong and not subdivided. Pupal respiratory histoblast as in Text-fig. 189, with 3 primary branches (2 arising from a common base) and numerous thin secondary filaments.

Abdomen. Shaped as in Text-fig. 6 ; general colour very pale, milky-white, without trace of darker segmental mottling in material seen. Ventral papillae absent. Cuticle dorsally on median and posterior segments with numerous flattened spatulate scales (Text-fig. 153), the scales strongly tapering basally. Rectal scales present. Rectal gills with variable number of long secondary lobules, 8–12 in each lateral lobe and 5–10 in the median lobe in material seen (Freeman & de Meillon (1953) state that each lobe is without secondary lobules but this is the case, as usual, only in small immature larvae). Anal sclerite of usual form, strongly sclerotized, *without* the median posterior sclerotization seen in other species of the *medusaeforme*-group, posterior arm extending to 16th–20th row of hooks. Posterior circlet with about 110–125 rows of 19–28 hooks.

MATERIAL EXAMINED. From Northern Nigeria and Transvaal.

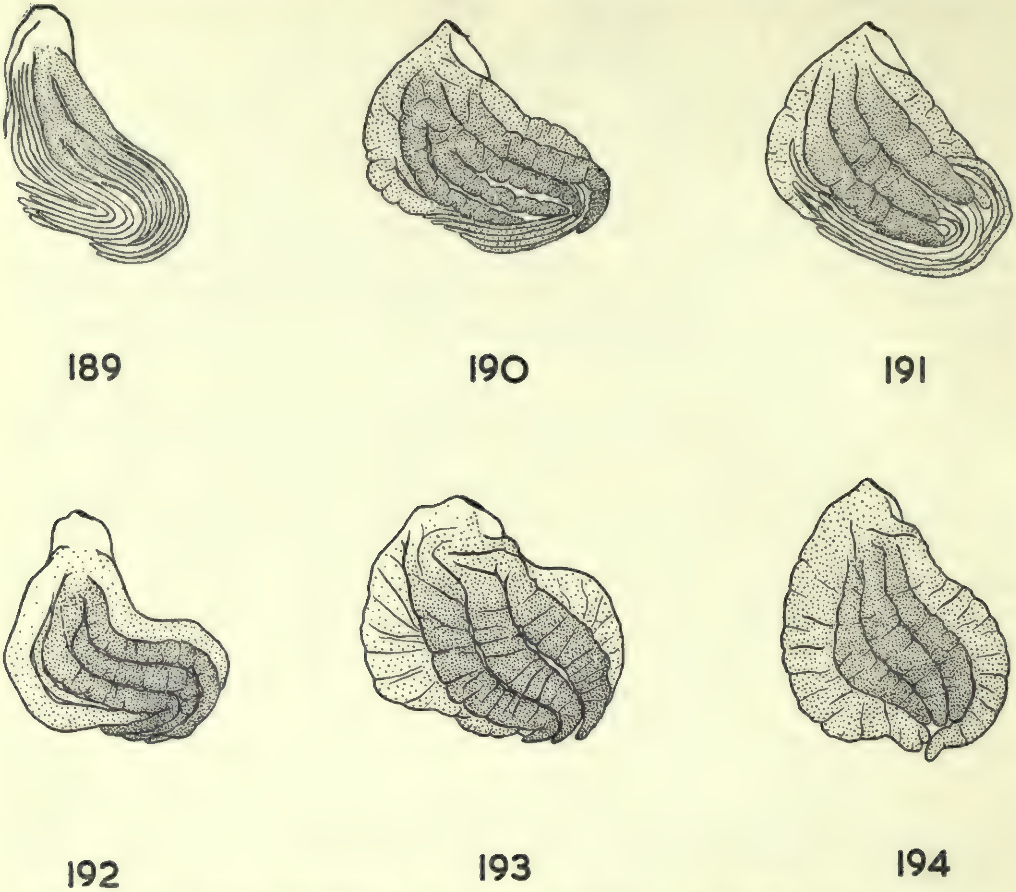
LARVAL HABITAT AND RANGE. Larvae of *bovis* are found mainly on trailing grasses in swift-flowing broken water, often in rapids, of large rivers. Immature stages only rarely occur in small watercourses, although in large rivers they are found in circumstances where the flow may be very reduced in the dry season. Larvae sometimes occur in company with those of *damnosum*, *cervicornutum*, or *griseicolle*. Widely distributed over the Ethiopian Region from Ghana east to Eritrea and south to Cape Province.

Simulium damnosum Theobald

Larva distinguishable from other Ethiopian species by the dense covering of dark flattened spatulate scales and the conical dorso-lateral tubercles on the abdominal segments (Text-fig. 9).

Length. Mature larva, 5–6·5 mm.

Head. Head capsule with variable pigmentation, usually strongly pigmented yellow-brown to dark brown, sometimes very dark brown or even blackish-brown ; pale areas around eye-spots and on eye-brow stripes, and usually also anteriorly on cephalic apotome ; some specimens with head capsule pale and only pigmented on medium part of cephalic apotome and laterally above level of eye-spots ; in addition to general pigmentation head capsule shows indistinct positive pattern comprising antero-lateral and postero-median groups of head-spots (Text-fig. 27), the head-spots darker than surrounding pigmentation, and traces of darker pigmen-



FIGS. 189–194. Pupal respiratory histoblast ("gill-spot") of mature larva of (189) *S. bovis* ; (190) *S. medusaeforme* form *hargreavesi* ; (191) *S. medusaeforme* type form ; (192) *S. vorax* type form ; (193) *S. colas-belcouri* ; (194) *S. damnosum*.

tation in area of postero-lateral spots ; antero-median spots absent or very indistinct ; sides of head capsule with indistinct spots (Text-fig. 27). Postgenal cleft very large, rounded cordate (Text-fig. 47), occupying almost the whole ventral aspect of head ; postgenal bridge very short, less than half as long as hypostomium. Hypostomium (Text-fig. 67) with usual row of 9 apical teeth, the teeth broad and blunt and forming a slightly concave row, so that the corner teeth are the most prominent, and median tooth usually slightly shorter than corner teeth ; middle tooth of intermediate teeth a little larger than inner intermediate tooth, so that the smallest apical teeth are those immediately on either side of median tooth ; 3–4 small lateral serrations, only one (instead of the usual two) strongly sclerotized serration on the ridge running back from corner tooth, with hindmost serration lying slightly anterior to first hypostomial seta ; hypostomial setae 4–6 (usually 5) in each row, diverging posteriorly from lateral margin of hypostomium ; distance between apex of corner tooth and first hypostomial seta only a little over half of that between corner teeth. Antenna (Text-fig. 89) short and just about equal in length to stem of cephalic fan, pigmented yellowish-brown, pigmentation strong on first segment, first segment about 3·5–4 times as long as broad, segment length ratios 4·4 : 7 : 4·6. Mandible of typical form, posterior serration present, small (Text-fig. 111), anterior serration slightly elongate but not produced as in *vorax*, comb teeth very large and strong and first 3 comb teeth equal in size forming an even row (figured by Grenier & Ovazza (1951)). Maxillary palp rather short and stout, about 2·5 times as long as breadth at base (Text-fig. 135). Cephalic fan with very variable number of rays, 37–46 in West African material seen, but only 19–24 in some material from Uganda (as recorded by Gibbins (1933)). Freeman & de Meillon (1953) give " about 20 " and suggest that the number is fewer than in most species, but this is not the case in larvae from most areas. Grenier & Ovazza (1951) give about 40 for material from French Congo, and it appears that this is about the usual number.

Thorax. Pale yellowish, grey or sometimes greenish-grey, histoblasts usual milky-white except for dark respiratory organ of mature larva ; cuticle densely covered dorsally and laterally with dark setae, the setae flattened and elongate, slightly scale-like (Text-fig. 154) ; cuticle of proleg laterally and ventrally with numerous setae, these setae generally narrower and more spine-like than general body setae. Proleg circlet with about 30–35 rows of 7–11 hooks ; lateral plate only very lightly pigmented, with about 9–10 processes, the processes strong and without secondary processes. Pupal respiratory histoblast with 5 large wrinkled branches externally visible (Text-fig. 194), and 6 other branches arising in pairs behind these (the figure of the " gill-spot " given by Gibbins (1933) is not accurate since it shows 4 filaments lying between the basal arms).

Abdomen. Shaped usually as in Text-fig. 9, with remarkable conical dorso-lateral paired tubercles on first 5 segments (and traces of a pair of similar tubercles on metathoracic segment making a series of 6 pairs), the tubercles often very strongly developed as sharp pointed cones but sometimes reduced and in some larvae more or less absent ; tubercles apparently absent in first stage larva, but present in second instar and subsequent stages. General colour pale yellowish, yellow-grey, pale grey or greenish-grey with traces of darker segmental mottling, but colour blackish to naked eye because of the dense covering of dark setae, especially on dorsal tubercles. Ventral papillae absent. Cuticle densely covered with flattened scale-like setae (Text-fig. 154), the setae variable in size and slightly variable in form, dark and strongly sclerotized ; distribution of scales fairly even but few ventrally on intermediate abdominal segments and strongly concentrated dorsally on tubercles, the concentration of setae giving the tubercles a darkened appearance ; setae abundant ventrally on terminal segments so that ventro-apical region of abdomen does not appear much paler than rest of abdomen as in most species. Rectal scales absent. Rectal gills with numerous but a variable number of long narrow secondary lobules in each lobe, from 9–15 lobules seen in the median lobe and 10–17 in lateral lobe ; total number of lobules in whole gill varying from about 29–49 ; median lobe often with fewer lobules than in each lateral lobe, but some specimens with the same number of lobules in each lobe, or median lobe occasionally with more lobules than the other lobes (gills first described by Roubaud (1907)). Anal sclerite (Text-fig. 169) of usual form, strongly sclerotized, anterior arms rather short, with a short posterior median lightly sclerotized prolongation, posterior arm reaching to about 26th–29th row of hooks. Posterior circlet with about 130–155 rows of 18–27 hooks, most rows with about 21–24 hooks (Gibbins (1933) gives up to 30 hooks but I have not seen more than 27 per row in the mature larvae I have examined).

MATERIAL EXAMINED. From Northern Nigeria, Southern Cameroons, Ghana, Sierra Leone, Sudan, Uganda, Tanganyika, and Nyasaland. There appears to be little geographical variation in the larvae, although in some larvae seen from Tanganyika, Uganda and Nyasaland there are a number of much larger scales scattered among the usual small scales, whereas in West African and Sudanese larvae the scales are of more uniform small size. In some larvae from Tanganyika a small number of enormously enlarged scales are present postero-dorsally on the abdomen.

LARVAL HABITAT AND RANGE. Larvae are found on trailing grasses, sticks, palm-fronds, corn-stalks, fish-traps, and other objects dipping into or lodged in swiftly-flowing broken water, mainly in the rapids of larger rivers; larvae also occur occasionally on stones, the solid rock-bed of rivers, or even on hard mud, sometimes in placidly-flowing unbroken water. The most favoured stiuation, however, is normally on grass-stems and leaf-blades (principally on living grasses) which trail in foaming turbulent water or in places where the water flows very rapidly down rock-inclines but may not be broken. There is usually little or no breeding actually in waterfalls, but characteristic breeding places are in the rapids above and below falls. In small streams there is usually little or no breeding of *damnosum*, although occasional larvae and pupae may be found in suitable parts of the smaller tributaries during the wet-season in the savannah areas and throughout the year in forested areas. Larvae are frequently found in very large masses (appearing black because of the dense covering of setae) and may be in company with other fast-water species, including *vorax*, *medusaeforme hargreavesi* and *bovis*; in very large rivers they sometimes occur with *adersi* and *griseicolle*, and in slow water of smaller rivers with *unicornutum*. I have also collected damnosum occasionally with *cervicornutum* and *aureosimile*. Common and widely distributed throughout the Ethiopian Region, even into the very dry territories such as Sudan, Eritrea and South-West Africa.

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NOTES ON SOME MALLOPHAGA FROM MAMMALS

By G. H. E. HOPKINS

THE first part of this paper is based on a large and important collection of Canadian material submitted to me for examination by Professor G. J. Spencer of the University of British Columbia; this collection contains three new species and adds details to our knowledge of a number of others. Mr. G. P. Holland, in charge of Insect Systematics and Biological Control, Canadian Department of Agriculture, added a few specimens of a species, from the American Bison, which has been recorded previously on only one occasion (from the European Bison) and about the specific distinctness of which doubts had been expressed which are completely dispelled by the presence in the present material of the hitherto unknown male. In the second part of the paper I have taken the opportunity to deal with two species (one of them new) sent to me by Col. K. C. Emerson of the United States Army and one received from Dr. F. Zumpt of the South African Institute for Medical Research. I am grateful to the senders for presenting the types of the new forms (except *Trichodectes emersoni*) and a share of the other material to the British Museum (Natural History) and to the Trustees of the Museum for all the drawings and photographs illustrating this paper.

In the counts of specimens given below nymphs are nearly always ignored, because without special collecting-methods the proportion of nymphs in a collection bears little relation to the proportion in the natural population from which the collection was made. All scientific names of North American hosts are given in the form used by Miller and Kellogg (1955, *List of N. American recent mammals*).

CANADIAN MATERIAL

Trichodectes (Trichodectes) canis (De Geer, 1778)

Ricinus canis, De Geer, 1778, *Mém. Hist. Ins.*, **7**: 81, pl. 4, fig. 16.

From puppy, Kamloops, B.C., 7.vii.1935, G. J. Spencer: 1 ♂, 2 ♀.

From puppy, Vancouver, B.C., –.xi.1945, G. J. Spencer: 2♂, 2♀.

From *Canis lupus columbianus* Goldman (British Columbia Wolf), Deadman's Creek, Kamloops district, B.C., 22.i.1944, Spencer-Keyes: 7 ♂, 24 ♀.

From *Canis latrans incolatus* Hall (Northwestern Coyote), Quick, B.C., –.iii.1938, 12.xi.1940 and 14.i.1945, H. Wearne: 70 ♂, 59 ♀.

From *Canis latrans incolatus*, Birch Island, near Vavenby, B.C., 16.x.1941, T. K. Moilliet: 14 ♂, 20 ♀.

From *Canis latrans incolatus*, Springhouse, Williams Lake, B.C., April–May 1950, G. J. Spencer: many thousands of specimens. Professor Spencer notes that these were from four coyotes, but mostly from two individuals.

From *Canis latrans lestes* Merriam (Mountain Coyote), Mission, B.C., 4.ix.1940, I. McT. Cowan: 5 ♂, 11 ♀.

The type host of this species is *Canis familiaris* Linn., and it occurs on this host in nearly all parts of the world, though it is apparently absent from some of the hotter areas, where it is replaced by an unrelated species, *Heterodoxus spiniger* (Enderlein). It has also been recorded from other Canidae and there are several previous records from various subspecies of *Canis lupus* and *C. latrans*.

The sexes are usually found in rough equality (excluding the enormous batch, the total from coyotes in the present collection is 89 ♂ 90 ♀), so it is possible that the marked discrepancy in numbers between males and females in the sample from a wolf indicates some physiological differences, but it is more probably due merely to chance.

Trichodectes (Trichodectes) pinguis euarctidos Hopkins, 1954

Trichodectes pinguis euarctidos. Hopkins, 1954, *Entomologist* **87** : 142, figs. 2, 3, 5, 6, 8–11.

From *Euarctos americanus cinnamomus* (Audubon & Bachman) (Rocky Mountain Black Bear), Gray Creek, Kootenays, B.C., 3.vi.1936, T. K. Moilliet : 16 ♂, 14 ♀.

From *Euarctos americanus cinnamomus*, Vavenby, B.C. 4.vi.1937, McM.: 1 ♀.

The batch from Gray Creek recorded above is from the same individual bear as the type series, and Professor Spencer informs me that there are at the University of British Columbia a further 15 males and 101 females (in alcohol) from this individual. This makes it necessary to modify my statement (1954, p. 145) that the sexes are in almost numerical equality in this subspecies, for the additional material combined with the original batch gives a total of 116 males and 206 females. Even assuming, as is very probable, that some of the specimens in alcohol which have been recorded as females are actually large nymphs, it would appear that females are considerably commoner than males.

The American Black Bear is the only known host of this subspecies, which is known from British Columbia, Ontario and Idaho.

Trichodectes (Trichodectes) octomaculatus Paine, 1912

Trichodectes octomaculatus. Paine, 1912, *Ent. News* **23** : 438, pl. 20, fig. 1.

From *Procyon lotor vancouverensis* Nelson & Goldman (Vancouver Island Raccoon), Courtenay, Vancouver Island, British Columbia, 24.i.1948, G. J. Spencer : 1 ♂.

The type host of this species is *Procyon lotor psora* Gray, and it has been recorded from a number of subspecies of *P. lotor*. Records from the Crab-eating Raccoon, *Procyon cancrivorus* (G. Cuvier), however, refer to a different though closely related species, *T. fallax* Werneck.

Trichodectes (Stachiella) ermineae (Hopkins, 1941)

Stachiella ermineae. Hopkins, 1941, *Ann. Mag. nat. Hist.* (11) **7** : 38.

From *Mustela erminea richardsoni* (Bonaparte) (Hudsonian Ermine), Meldrum Creek, Chilcotin, B.C., 19.v.1950, W. Cottle : 8 ♂, 12 ♀.

From *Mustela erminea anguinae* Hall, (Vancouver Island Ermine), Croteau Lake, Forbidden Plateau, Vancouver Is., B.C., 30.viii.1943, G. C. Carl : 1 ♂, 8 ♀.

From *Mustela vison energumenos* (Bangs) (British Columbia Mink), Port Moody, British Columbia, 4.ii.1951, G. J. Spencer : 9 ♂, 6 ♀.

This species was described from material collected from the British and German subspecies of the Stoat or Ermine, *Mustela erminea stabilis* Barrett-Hamilton and *M. erminea aestiva* Kerr. It does not seem to have been recorded hitherto from North American subspecies of this host under its correct name, but *Trichodectes* " *retusus* Nitzsch " of Osborn 1896 (*Bull. U.S. Dep. Agric.* (n.s.) no. 5, p. 237) and of Morse 1903 (*Amer. Nat.* **37** : 623, figs.) is probably this species. Osborn's specimens, figured by Morse, were from Ames, Iowa, and the host must have been *M. erminea bangsi* Hall. Osborn also recorded " *retusus* " from Mink (*Mustela vison* Schreber), and Werneck (1948, *Os Malófagos de Mamiferos*, part 1, p. 158) determined as *ermineae* specimens obtained from this latter host at Seattle (Washington) and Kirkfield (Ontario).

Trichodectes (Stachiella) kingi McGregor, 1917

Trichodectes kingi. McGregor, 1917, *Ann. ent. Soc. Amer.* **10** : 167, pl. 17, fig. 1.

From *Mustela rixosa rixosa* (Bangs) (Least Weasel), Ootsa Lake, British Columbia, 1.ii.1940 : 3 ♂, 5 ♀.

The original record of this species was from " weasel, *Putorius* sp. from Florence, Montana ; a weasel from this locality could be *Mustela rixosa*, *M. erminea* or *M. frenata*. Werneck (1948, *Os Malófagos de Mamíferos*, part 1, p. 160, figs. 239–243) redescribed the species, after examining the syntypes, and recorded it from various undetermined weasels, from *Mustela erminea* ssp., and from " Alaska Weasel ", which is *M. rixosa eskimo* (Stone). I accept Werneck's determination of the specimens stated to be from *M. erminea* without hesitation, but have some reservations about the determination of the host, especially now that *Trichodectes* (*Stachiella*) *ermineae* (Hopkins) is known to occur on Nearctic forms of *M. erminea* as well as on Palaearctic ones. The main differences between these two species of *Trichodectes* is that the head is as long as broad in *kingi* but broader than long in *ermineae*. It is unfortunate that the present specimens of *kingi* are not in good condition, for the few previously known males of the species are, like these, not well enough preserved to allow a description of the genitalia to be made.

Trichodectes (Neotrichodectes) minutus Paine, 1912

Trichodectes minutus. Paine, 1912, *Ent. News* **23** : 439, pl. 20, fig. 4.

From *Mustela frenata oribasus* (Bangs) (Bangs' Long-tailed Weasel), Dry Farm, Nicola Range, B.C., 28.viii.1932, G. J. Spencer : 6 ♂, 4 ♀.

The original record of this species was from *Mustela frenata noveboracensis* (Emmons) (New York Long-tailed Weasel). Werneck (1948, *Os Malófagos de Mamíferos*, part 1, pp. 145, 146) saw 4 lots from *M. frenata* sspp., 1 from *M. nigripes* (Audubon & Bachman) (Black-footed Weasel) and 1 from *M. stolzmanni* Taczanowski (Peruvian Weasel).

The host-distribution of the Trichodectidae found on Mustelidae in North America is peculiar and very interesting, but our knowledge of it is much limited by paucity of records, misdetermination of the parasites (and perhaps also of the hosts in some instances) and the fact that so many of the records are from such insufficiently-determined hosts as "weasel", "*Putorius*" or "*Mustela*". It is because all the hosts have definite determinations that the few batches in the present collection make a significant contribution towards our knowledge of this subject. Ignoring records from hosts other than Mustelidae, *Trichodectes s. str.* is found in North America on the badger, subgenus *Stachiella* (barely separable from *Trichodectes s. str.*) on *Mustela*, and subgenus *Neotrichodectes* on skunks and *Mustela*. Hitherto we have had practically no indication whether both *Stachiella* and *Neotrichodectes* are to be found on the same species of *Mustela*, but the present records, taken together with those published by Werneck, are sufficient to indicate the probability that this is not the case. It seems likely that *Trichodectes* (*Stachiella*) *ermineae* is confined to *Mustela erminea* and *M. vison*, *T.* (*S.*) *kingi* to *M. rixosa*, and *T.* (*Neotrichodectes*) *minutus* to *M. frenata* and perhaps *M. nigripes*, but many more records from properly determined hosts will be required before we can be sure whether these suggestions are correct.

Trichodectes (Neotrichodectes) osborni (Kéler, 1944)

Trichodectes mephitidis. Osborn, 1896 (not Packard, 1873), *Bull. U.S. Dep. Agric.* (n.s.) no. 5, p. 242, fig. 150.

Neotrichodectes osborni. Kéler, 1944, *Stettin. ent. Ztg* **105** : 182 (*nomen novum* for above).

From *Spilogale gracilis latifrons* Merriam (Spotted Skunk), University campus, Vancouver, B.C., 16.x.1936, G. P. Holland : 1 ♂, 7 ♀. Same host, locality and collector, 22.x.1936 : 7 ♂, 7 ♀.

The type host of *T. osborni* is *Spilogale interrupta* (Rafinesque), from Tama County, Iowa. Werneck (1948, *Os Malófagos de Mamíferos*, part 1, p. 140) records it from *S. gracilis gracilis* Merriam and *S. ambarvalis* Bangs. It probably occurs on all members of the genus *Spilogale*.

Felicola (Felicola) subrostratus (Burmeister, 1838)

Trichodectes subrostratus. Burmeister, 1838, *Handb. Ent.* **2** : 438.

From House-cat, Vancouver, B.C., 12.xii.1940 and 22.xi.1942, G. J. Spencer : 5 ♂, 28 ♀.
From Cat, Pillsbury, Okanagan Landing, B.C., 4.xi.1941, G. J. Spencer : 1 ♂, 3 ♀.

The domestic cat, *Felis catus* Linn., is the type host of this species and the only one on which it is likely to occur in Canada, though in tropical Africa it is found in great numbers on two not closely related members of the Viverridae. Males are normally scarcer than females but the excess of females in the present collection is greater than usual. It is possible that some males (which are much smaller than females) were passed over as nymphs.

Felicola (Felicola) spenceri sp. nov.

Text-fig. 2; Pl. 1, fig. 1

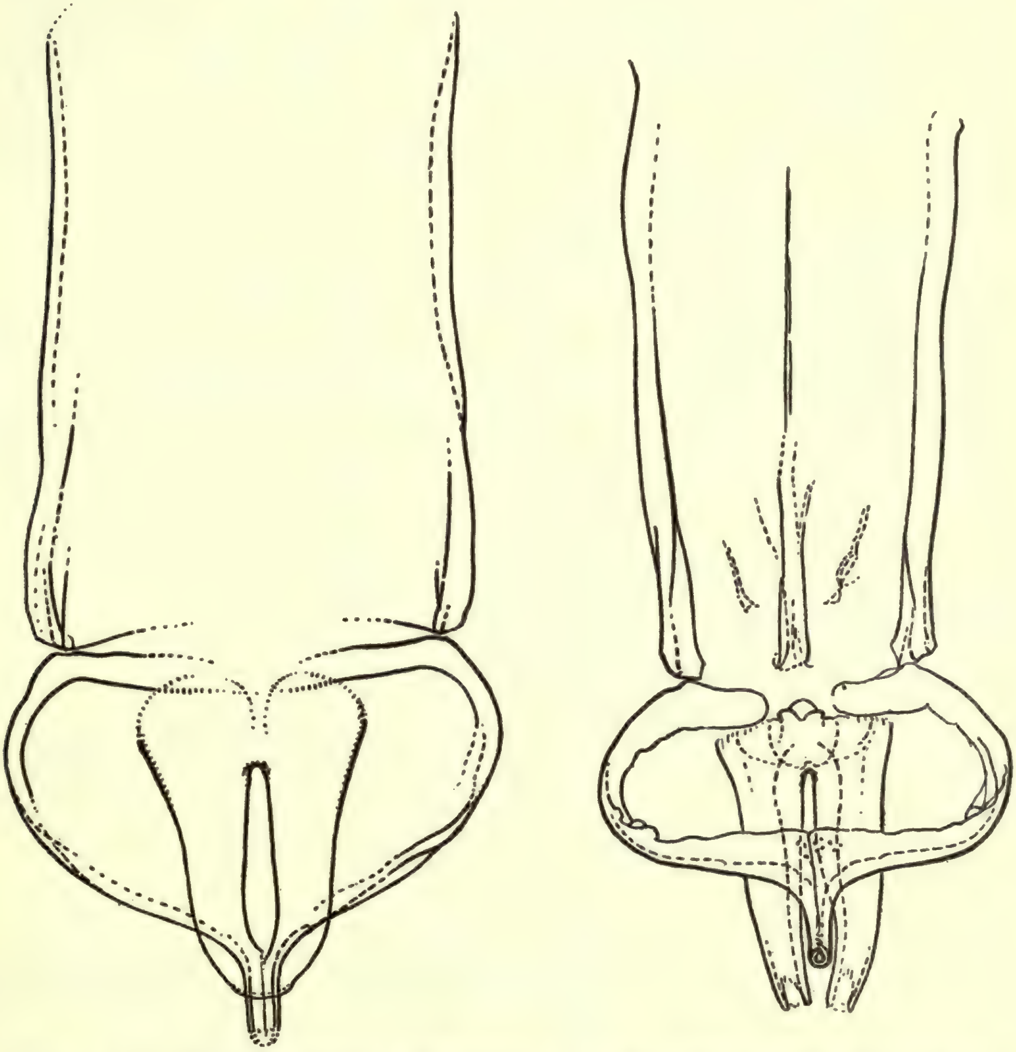
From *Lynx canadensis canadensis* Kerr (Canadian Lynx), Lac La Hache, British Columbia, 1.xi.1954, G. J. Spencer : the ♂ holotype, ♀ allotype and 12 ♂, 11 ♀ paratypes.

From *Lynx canadensis canadensis*, Quesnel or Lac La Hache, 1.xi.1954, G. J. Spencer: 14 ♂, 10 ♀ paratypes.

From *Lynx canadensis canadensis*, Williams Lake, British Columbia, 15.xii.1949, H. Jobin: 1 ♂, 2 ♀ paratypes.

Very like *F.* (*F.*) *felis* (Werneck), of which it might be considered a subspecies, but the differences in the male genitalia seem to justify specific rank.

Male (Pl. 1, fig. 1). Genitalia as in Text-fig. 2, the basal plate (or basal apodeme) diverging somewhat towards the proximal end (sides subparallel in *felis*, Text-fig. 1) and with a large and well sclerotized median rod at the distal end (the rod absent in



FIGS. 1, 2. Genitalia of males of *Felicola* spp.: 1. *F. felis* (Werneck), from type host and locality. 2. *F. spenceri* sp. nov., holotype.

a paratype of *felis* and in Werneck's figure of the holotype, very small in a specimen from *Felis jaguarundi* Fischer). Spicules of copulatory sac much larger than in *felis*. Endomeres narrower than in *felis*, their sides less divergent and the basal junction between the endomeres of the two sides narrower.

Female. I cannot distinguish *spenceri* from *felis* in this sex.

Werneck (1948, *Malófagos de mamíferos*, part 1, p. 224) had not seen Mallophaga from *Lynx canadensis*; he gives many records of *Felicola felis* from various subspecies of *Lynx rufus* (Schreber) (Bobcat) but though I have not seen specimens from this host I think it improbable that they are *spenceri*, for it is unlikely that so careful a worker as Werneck would not have noticed the differences. The type host of *felis* is an ocelot, *Felis pardalis brasiliensis* (Oken); I suspect that the form from *Felis jaguarundi* may be subspecifically distinct, but refrain from naming it because I have seen only one male. I am much indebted to Dr. Werneck for the loan of paratypes of *F. felis*.

Damalinia (Bovicola) equi (Denny, 1842)

Trichodectes equi. Denny, 1842, *Mon. Anopl. Brit.*: **61**, 191.
Trichodectes pilosus. Giebel, 1874, *Insecta epizoa*: 59.
Trichodectes parumpilosus. Piaget, 1880, *Les Pédiculines*: 397, pl. 32, fig. 5.

From horse, Vancouver, B.C., –.ii.1926, G. J. Spencer: 4 ♀.

This is a well-known and cosmopolitan parasite of the horse, *Equus caballus* Linn. The male is excessively rare, though in a very closely related species, occurring on a zebra, males are almost as common as females.

The authorship of the name is commonly ascribed to Linnaeus, but the first description of the species is that of Denny.

Damalinia (Bovicola) bovis (Linn., 1758)

Pediculus bovis. Linnaeus, 1758, *Syst. Nat.* ed. **10**: 611.
Trichodectes scalaris. Nitzsch, 1818, *Germar's Mag. Ent.* **3**: 296.

From domestic cattle, Langley Prairie, B.C., 24.iii.1938, J. G. Jervis: 20 ♀.
From calf, Barnhart Vale, B.C., 16.ii.1944, G. J. Spencer: 4 ♀.

A cosmopolitan parasite of domestic cattle. Males are extremely uncommon and Mathysse (1944, *J. econ. Ent.* **37**: 436–442) has shown that the species is parthenogenetic.

Damalinia (Bovicola) sedecimdecembrii (Eichler, 1946)

Text-fig. 3; Plate 1, fig 2, 3

Bovicola sedecimdecembrii. Eichler, 1946, *Berlin. Munch. tierärtzl. Wschr.* 1946: 44, fig.

From *Bison bison* (Linn.) (American Bison), near Hay Camp, Wood Buffalo Park, 22.ii. 1955, W. A. Fuller, sent in by G. P. Holland: 3 ♂, 1 ♀ and 3 nymphs.

Male (Pl. 1, fig. 2). Antenna greatly modified (almost unmodified in *bovis*), the first segment only a little more than 1½ times as long as broad and about as long as the second and third segments together. Tip of abdomen terminating in a pair of deeply coloured sharp thorn-like projections separated by a deep U-shaped bay. Genitalia (Text-fig. 3) of the same type as in *bovis* but differing greatly in details, the basal apodeme with straighter and more divergent sides, the parameral ring much larger and almost heart-shaped in dorsal view, the endomeres straight, stouter, with blunter free apices, and without a basal flange.

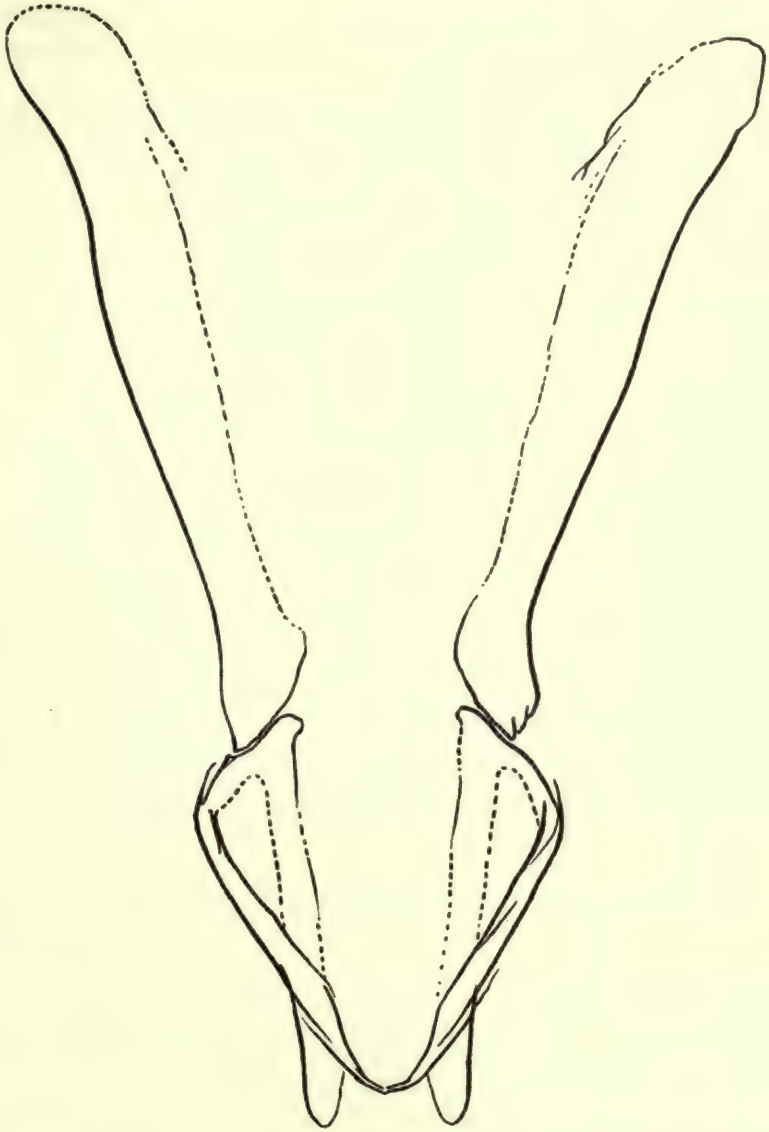


FIG. 3. Genitalia of male *Damalinia sedecimdecembrii* (Eichler), from *Bison bison*, Wood Buffalo Park, Canada.

Female (Pl. 1, fig. 3). The most obvious differences from *bovis* are the shorter head with more truncate anterior margin and narrower sclerotized marginal band, much less strongly coloured abdominal pleurites, and somewhat larger size (length of fully expanded specimen about 2 mm. as against about 1·6 mm. in my largest specimen of *bovis*). Two of the other differences from *bovis* noted by Eichler (stouter antennae and stouter and relatively short legs) are also confirmed by the present specimen, while the shape of the prothorax (stated by Eichler to be broader and straighter-sided than in *bovis*) cannot be made out as the specimen is slightly crushed, but it should be noted that Eichler's figure (1955, *Urania* **17** : 35, fig. 5) was obviously drawn from a not fully expanded specimen.

No member of the Mallophaga has hitherto been recorded from the American Bison, and the determination of these specimens must be considered somewhat doubtful while the male of *sedecimdecembrii* remains unknown from European specimens, but the correspondence between the Canadian female and Eichler's description and figure is so exact as to make it imperative to regard them, at least provisionally, as the same. Eichler's specimens were collected in 1918 from *Bison bonasus* (Linn.) (the European Bison or Wisent) in the Bialowieza forest, Poland, and the date is important because it means that the host was one of the original wild stock which became extinct in 1921 and was subsequently re-established from captive stock. It is not possible to give a subspecific name for the Canadian host because the herds in the Wood Buffalo Park are of mixed descent, an original stock of *Bison bison athabascae* Rhoads having subsequently received a considerable admixture of the blood of *B. b. bison* (Linn.).

The fact that no Mallophaga have been found previously on the American Bison, although Cameron, for instance (1923, *Vet. J.* **79** : 331–336) records having examined 250 of them for parasites, is not necessarily an indication that they are rare, but merely of the difficulty of obtaining Mallophaga from so large and shaggy a host without using a much more elaborate technique than searching. Eichler suggested in his original description that *sedecimdecembrii* might be parthenogenetic, but if my determination of these specimens is correct this suggestion is improbable. Eichler must have been relying on the analogy of *D. bovis*, since the absence of males from so small a batch as he had is altogether insufficient evidence to support his suggestion, but closely related species may differ entirely in this respect.

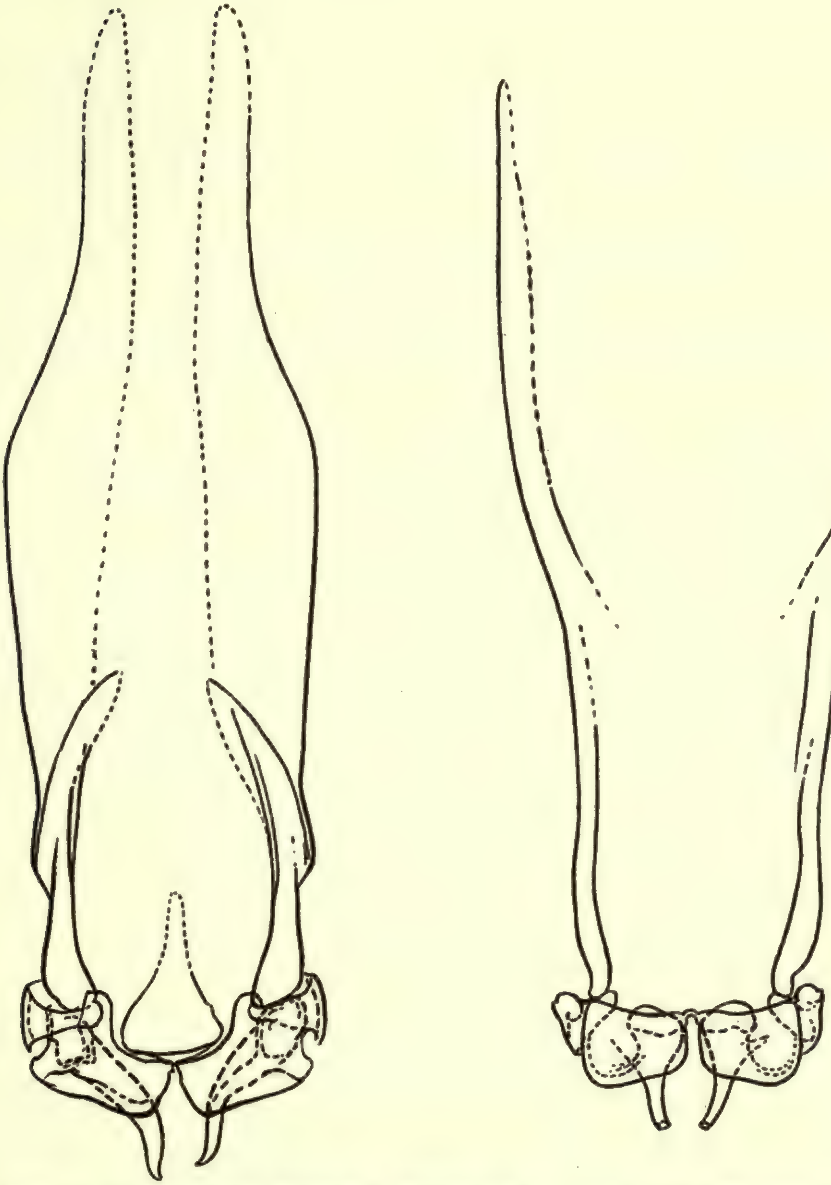
Damalinia (Bovicola) ovis (Schrank, 1781)

Text-fig. 4 ; Pl. 1, fig. 5

Pediculus ovis. Schrank, 1781, *Enum. Ins. Austr. indig.*, p. 502, pl. 1, figs. 8, 9.
Pediculus sphaerocephalus. Olfers, 1816, *De Veget. . . .* , p. 85.

From *Ovis canadensis californianus* Douglas (Northwestern Bighorn Sheep), Churn Creek, British Columbia, 1.vi.1951, L. Sugden & G. Mitchell : 2 ♀.

A well-known cosmopolitan parasite of the domestic sheep, *Ovis aries* Linn., but not hitherto recorded from the Bighorn. As regards records from other sheep, specimens from *Ovis musimon* Pallas (the Mouflon) were correctly determined but



FIGS. 4, 5. Genitalia of males of *Damalinia* spp.: 4. *D. ovis* (Schrank), neotype. 5. *D. oreamnidis* sp. nov., holotype.

the record requires confirmation because the lice were obtained from captive hosts, while a record from *Ammotragus lervia* (Pallas) (the Barbary Sheep, Arui or Aoudad) refers to misdetermined specimens of a quite different species. This is, therefore, the first undoubted record from a wild sheep.

The rounded setose basal lobe of the gonapophyses forms a smooth curve in both these specimens, whereas in most females from the type host it forms a hump. But some specimens from the type host approach these very closely and more material, including males would be required before one could consider that specimens from the Bighorn are distinct.

Damalinia (Bovicola) oreamnidis sp. nov.

Text-fig. 5 ; Pl. 1, fig. 6

> From *Oreamnos americanus missoulae* (Allen) (Montana Mountain Goat), Bryant, Banff National Park, Alberta, 14.vi.1942, I. McT. Cowan : the ♂ holotype and 1 ♂ paratype, 4 nymphs.

The species is close to *D. ovis* and the specimens are not in very good condition, so I have not been able to detect any differences except in the relatively shorter head and in the male genitalia. These latter, however (Text-fig. 5), differ so considerably as to leave no doubt that the difference is specific.

In both the species the genitalia are much specialized and the homology of the distal sclerites very doubtful. The basal plate (or basal apodeme) is much narrower proximally in *ovis* (Text-fig. 4) than in *oreamnidis*, in which it is nearly twice as wide in this portion as in the distal half. The claw-like structures which are probably the endomeres and which project further distally than any of the other sclerites are shorter and more swollen basally in *oreamnidis* and the plate-like structures which I identify with great doubt as the telomeres are much more regularly shaped in this species than in *ovis*.

This appears to be the first record of any Mallophaga from *Oreamnos americanus*.

Damalinia (Bovicola) longicornis (Nitzsch, 1818)

Text-fig. 6

Trichodectes longicornis. Nitzsch, 1818, *Germar's Mag. Ent.* **3** : 296.
Trichodectes similis. Denny, 1842, *Monographia Anoplurorum Britanniae* : 61, 195, pl. 17, fig. 6
Bovicola americanum. Jellison, 1935, *J. Parasit.* **21** : 410, fig. (new synonymy).

> From *Cervus canadensis nelsoni* Bailey (Rocky Mountain Wapiti), Jasper Park, Alberta, 20.xii.1944, I. McT. Cowan : 1 ♀.
>
> From *Cervus canadensis nelsoni*, Banff, Alberta, –.ii.1946, I.McT. Cowan : 3 ♀.

The original specimens of *longicornis* and *similis* were from the Red Deer, *Cervus elaphus* Linn., in Europe, while Jellison's material was from the Wapiti, *Cervus canadensis canadensis* Erxleben, from Wyoming. Werneck (1950, *Os Malófagos de Mamíferos*, part 2, p. 79) noted his inability to distinguish specimens obtained from these two hosts but refrained from considering the names to be synonymous because males are not known in either instance. It is, however, fully in accord with probability that the same lice should occur on *Cervus elaphus* and *C. canadensis*, since the latter is little (if any) more than a giant subspecies of the former.

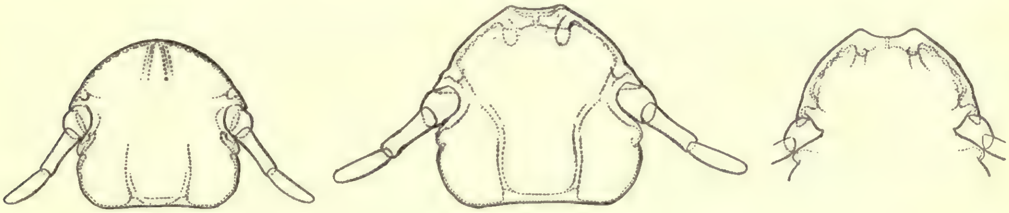
Damalinia (Bovicola) concavifrons sp. nov.

Text-fig. 7, 8

Bovicola "*longicornis* (Nitzsch)". Werneck, 1950, *Os Malófagos de Mamíferos*, part 2 : 75 (part ; specimens shown in figs. 58 and 59).

Banff, Alberta, from *Cervus canadensis nelsoni* Bailey (Rocky Mountain Wapiti), 3.vi.1943, I. McT. Cowan : the ♀ holotype and 40 ♀ paratypes.

D. concavifrons apparently differs from *D. longicornis* only in the characters of the preantennal portion of the head, which has relatively thick walls, strongly sloping sides and a short and concave anterior margin in *concavifrons* (Text-fig. 7), whereas in *longicornis* (Text-fig. 6) the walls are thinner, the sides are much less sloping and the anterior margin much longer and wholly convex.



Figs. 6–8. Heads (setae omitted) of *Damalinia* spp.: 6. *D. longicornis* (Nitzsch). 7. *D. concavifrons* sp. nov., holotype. 8. *D. concavifrons* sp. nov., paratype.

D. concavifrons occurs on *Cervus elaphus* as well as on *C. canadensis*, and the specimens figured by Werneck are from the latter host. He considered the difference to be due to polymorphism, and this possibility cannot be wholly excluded. But in other species of *Damalinia*, in which both sexes are known, the shape of the anterior portion of the head is a very constant character and any marked difference in its shape is invariably accompanied by obviously specific differences in the genitalia of the male. In these circumstances it seems safer to regard *longicornis* and *concavifrons* as distinct species. There is some variation in the depth of the concavity of the anterior margin of the head in *concavifrons* (Text-figs. 7, 8) but the shortness of the margin seems constant.

A point of considerable interest is that there appears to be no record, either in Europe or North America, of occurrence of both species on the same individual host. Nitzsch's original series of *longicornis* comprised 12 specimens when it was examined by von Kéler (1938, *Nova Acta Leopoldina* (n.f.) **5** : 456) all of which were round-headed, as were all the 3 females in a batch from Germany examined by Werneck (1950, p. 76), but a batch of 14 females from *C. elaphus* in Amsterdam Zoo. comprised only specimens of *concavifrons*. Jellison's type-series of *americana* comprised 150 females from four or more animals, and as he does not mention any variation in the shape of the head it must be assumed that all were round-headed. Of the three Wapiti from which there are Mallophaga in the Spencer collection, two were infested only with *longicornis* and the third only with *concavifrons*. These facts are almost perfectly paralleled in the case of the two species of Trichodectidae found on members of the genus *Odocoileus* in North America, which is an additional reason for regarding *longicornis* and *concavifrons* as distinct species.

It seems certain that both *longicornis* and *concavifrons* must be parthenogenetic, though it is probable that males occur very rarely, as in other parthenogenetic species of the genus (*D. bovis* and *D. equi*).

Damalinia (Tricholipeurus) lipeuroides (Mégnin, 1884)

Trichodectes lipeuroides. Mégnin, 1884, *Naturaliste* no. 62 : 494, figs.

Eutrichophilus mexicanus. Mjöberg, 1910 (not Rudow, 1866), *Ark. Zool.* **6**, part 13 : 79, figs. 49, 50, pl. 4, figs. 1, 2.

Eutrichophilus mazama. Stobbe, 1913, *Dtsch. ent. Z.* 1913 : 562 (*nomen novum* for *mexicanus* Mjöberg).

Tricholipeurus virginianus. Peters, 1930, *Proc. ent. Soc. Wash.* **32** : 76, figs. 1–3.

From *Odocoileus hemionus hemionus* (Rafinesque) (Rocky Mountain Mule-Deer), Quick, British Columbia, 16.i.1944, H. Wearne : 27 ♂, 15 ♀.

From *Odocoileus hemionus hemionus*, Quick, –.xi.1945 : 4 ♂.

From *Odocoileus hemionus hemionus*, Quick, 23.ii.1948 : 55 ♂, 10 ♀.

From *Canis latrans incolatus* Hall (N. W. Coyote), Quick, 12.x.1940, H. Wearne : 5 ♂, 8 ♀.

From *Odocoileus hemionus hemionus*, Vavenby, B.C., 1934, on piece of hide received from T. K. Moilliet : 1 ♀.

From *Odocoileus hemionus hemionus*, Vavenby, spring 1937, T. K. Moilliet : 1 ♀.

From *Odocoileus hemionus hemionus*, near Revelstoke, B.C., 22.v.1932, G. J. Spencer 2 ♀.

From *Odocoileus hemionus hemionus*, Banff, Alberta, 28.iv.1943 : 2 ♀.

From a sick *Odocoileus hemionus columbianus* (Richardson) (Columbian Black-tailed Deer or Coast Deer), Hardy Is., B.C., 3.iv.1943, G. J. Spencer : 9 ♂, 9 ♀.

From *Odocoileus hemionus columbianus*, Comox, Vancouver Is., B.C., 9.xi.1930, G. J. Spencer : 1 ♂.

From *Odocoileus hemionus columbianus*, Mt. Lehman, near Abbotsford, B.C., 22.v.1910, S. Hadwen : 8 ♂, 1 ♀.

From *Odocoileus hemionus columbianus*, Barnet, near Vancouver, B.C., 5.iv.1943, G. J. Spencer : 7 ♂, 10 ♀.

From *Odocoileus hemionus columbianus*, Cowichan Lake, British Columbia, 18.xii.1947 : 9 ♂, 1 ♀.

From *Odocoileus hemionus columbianus*, Victoria, B.C., 10.xi.1938, I. McT. Cowan : 10 ♂, 2 ♀.

From *Odocoileus hemionus columbianus*, Vancouver, B.C., 19.xi.1933, G. J. Spencer : 11 ♀.

From *Odocoileus hemionus columbianus*, Howe Sound, B.C., 7.xii.1929, G. J. Spencer : 1 ♂, 1 ♀.

From *Odocoileus hemionus columbianus*, Salt Spring Is., B.C., 2.ii.1941, I. McT. Cowan : 10 ♀.

The type host of this species, and that of the material on which the names given by Mjöberg and by Stobbe were based, is *Odocoileus virginianus mexicanus* (Gmelin) (Mexican White-tailed Deer), while Peter's material was from *O. v. virginianus* (Zimmerman) and *O. v. texanus* (Mearns), and there are records from a number of other subspecies of *O. virginianus*. The species has, however, been recorded many times from various subspecies of *Odocoileus hemionus* and there is no doubt that it is a normal parasite of both species of deer. The coyote had presumably picked up its infestation by feeding on a dead deer, and it is most unlikely that the infestation would have persisted, but the record fits in well with the instance recorded by Paine (1912, *Ent. News* **23** : 438) of the occurrence of 4 specimens of *Damalinia (Damalinia) forficula* (Piaget), another deer-parasite, on *Cuon alpinus* (Pallas) (Dhole, or Red Dog), each record tending to confirm the other.

The considerable preponderance of males in the Spencer collection (136 ♂, 84 ♀) is probably misleading and perhaps due to unintentional selection, since Crauford-Benson (1941, *Parasitology* **33** : 346–350) and Hopkins (1949, *Proc. zool. Soc. Lond.* **119** : 407) have both demonstrated the very great variability in sex-proportions in collections made from different portions of the host's body. Peters' material included 75 ♂ and 69 ♀ and that of Werneck 22 ♂, 29 ♀ (97 ♂ 98 ♀, for the two sets of records together).

Damalinia (Tricholipeurus) parallela (Osborn, 1896)

Trichodectes "*tibialis* Piaget." Osborn, 1896 (not Piaget, 1880), *Bull. U.S. Dep. Agric.* (n.s.) no. 5 : 240, figs. 147*a*, *b*.

Trichodectes parallelus. Osborn, 1896, *op. cit.*: 240, fig. 148.

Trichodectes odocoilei. McGregor, 1917, *Ann. ent. Soc. Amer.* **10** : 173, pl. 17, fig. 7.

From *Odocoileus hemionus hemionus* (Rafinesque) (Rocky Mountain Mule-Deer), near Revelstoke, B.C., 22.v.1932, G. J. Spencer : 5 ♀.

From *Odocoileus hemionus hemionus*, Quesnel, B.C., 18.v.1932, G. J. Spencer : 13 ♂, 1 ♀.

From *Odocoileus hemionus hemionus*, Quesnel, 19.v.1932, G. J. Spencer : 19 ♂, 7 ♀.*

From *Odocoileus hemionus hemionus*, Vavenby, B. C., spring 1937, T. K. Moilliet : 3 ♂.

From *Odocoileus hemionus columbianus* (Richardson) (Columbian Black-tailed Deer or Coast Deer), Duncan, B.C., 10.v.1942, G. J. Spencer : 2 ♂, 14 ♀.

The question of the correct name of this species is one of considerable difficulty. Osborn (1896, p. 240, fig. 147) misdetermined as *Trichodectes tibialis* Piaget " some specimens from the black-tailed deer (Baker collection)" which undoubtedly belong to the species later described by McGregor as *T. odocoilei*. Osborn also described as *T. parallelus* " three specimens (females) from deer, collection Cornell University, kindly loaned by Prof. J. H. Comstock ... Species of deer is not given, but probably Virginia deer (*Cariacus virginianus*) is meant "; Osborn's figure depicts a female or nymph. Peters, 1939 (in Spencer, *Proc. ent. Soc. B. C.* no. **35** : 18) placed *odocoilei* as a synonym of *parallelus*, but this synonymy was rejected by Werneck (1950, *Os Malófagos de Mamíferos*, part 2 : 184) on the grounds that the syntypes were nymphs, which are not determinable in this group ; the reason for Peters' belief is evidently (Peters, *in litt.*, 11.xi.1937, and see Werneck, 1950, p. 184) that he not unnaturally regarded as syntypes the specimens on a slide received from Professor Osborn and marked " Type ", but which contained " a number of specimens, among which were several males ", and which therefore cannot possibly belong to the original type-series ; it is very possible that they were some of the specimens which Osborn had misdetermined as *tibialis*. Even though these specimens must be ignored in considering the identity of *Trichodectes parallelus*, I still accepted the synonymy suggested by Peters (though with grave misgivings because of the inadequacy of Osborn's figure and Werneck's belief, which I shared, that the syntypes were nymphs) because Osborn's figure is much more like *odocoilei* than *lipeuroides*. But Col. Emerson kindly tells me that he has examined Osborn's syntypes of *Trichodectes parallelus*, that they are females with developed gonapophyses (though probably teneral) and that he has no doubt that they are the species subsequently described as *odocoilei*.

---

* Many specimens must have been removed from this tube, for the label refers to 42 ♂, 46 ♀.

The type host of *D. parallela* (Osborn) was merely " deer ", but Col. Emerson tells me that the slide bears the information, omitted by Osborn, that the specimens were collected at Ithaca, N.Y., on 12th Aug. '86, by L. Pearson, and that the host must, therefore, have been *Odocoileus virginianus* ssp. The type host of *D. odocoilei* is *Odocoileus virginianus macrourus* (Rafinesque) (Plains or Western White-tailed Deer) and there are many records from various subspecies of *O. virginianus* and *O. hemionus*. Occurrence of both this species and *lipeuroides* on the same host-individual is apparently rare, while a heavy infestation with one of them seems to preclude a heavy infestation with the other. In the present collection there are two apparent instances of a double infestation of one host-individual : the batch of specimens collected from *O. h. hemionus* at Vavenby in spring 1937 contains 3 male *parallela* and 1 female *lipeuroides*, while there are 5 females of *parallela* and 2 of *lipeuroides* in the batch obtained from the same subspecies of host near Revelstoke on 22.v.1932. The parallel with the occurrence of *D.* (*Bovicola*) *longicornis* and *D.* (*B.*) *concavifrons* on members of the genus *Cervus* is obvious.

Males and females of this species apparently occur in roughly equal numbers. Werneck (1950 : 180) examined 10 ♂, 13 ♀ and the present collection contains 37♂, 27 ♀ (60 ♂, 66 ♀ if the second tube from Quesnel is credited with the numbers it is stated to have contained originally). The great excess of males in the first tube from Quesnel is, therefore, presumably accidental and probably results from unintentional selection.

Damalinia (Tricholipeurus) sp.

From captive male *Odocoileus hemionus columbianus* (Richardson) (Columbian Black-tailed Deer), Vancouver, British Columbia, died 8.ii.1954 : many ♀.

These specimens are certainly not any of the known species from North American deer, the concavity of the frons being far more marked than in any of these ; in this respect they are not unlike *D.* (*Tricholipeurus*) *dorcelaphi* (Werneck), but differ markedly in the shape of the gonapophyses. It is very possible that they belong to a new species, but in view of the fact that the host was a captive I think it would be wrong to describe them, especially in the absence of males. The infestation was certainly established, for the batch contained many eggs and nymphs, but it may well have been acquired from a fellow-captive belonging to some other species. The parasite is not present in any of the collections from wild hosts.

Eutrichophilus setosus (Giebel, 1861)

Trichodectes setosus. Giebel, 1861, *Z. ges. Natwiss.* **18** : 86.

From *Erethizon dorsatum nigrescens* Allen (eastern Canada Porcupine), Jasper National Park, Alberta, 12.vi.1930, I. McT. Cowan, G. J. Spencer : 1 ♀.

From *Erethizon dorsatum nigrescens*, Jasper Park, 11.vi.1944, J. Hatter : 5 ♂, 8 ♀.

From *Erethizon dorsatum nigrescens*, Quesnel, B.C., 14.v.1932, J. McT. Gowan, G. J. Spencer : 15 ♂, 27 ♀.

From *Erethizon dorsatum nigrescens*, Kamloops, B.C., 21.vii.1934, G. J. Spencer : 33 ♂, 11 ♀.

From *Erethizon dorsatum nigrescens*, Williams Lake, B.C., 27.iii.1934, G. J. Spencer : 14 ♂, 32 ♀.

Erethizon dorsatum (Linn.) is the type host of this species and probably the only one on which it occurs in nature.

Geomydoecus sp.

A single nymph from *Thomomys talpoides* ssp., Carlyle Lake, Sask., 26.vii.1942, G. P. Holland.

There is some probability that this specimen is *G. thomomyus* (McGregor), which is known from *Thomomys talpoides fuscus* and *T. talpoides douglasi* in the U.S.A., but nymphs are not determinable in the genus *Geomydoecus*.

MATERIAL FROM OTHER AREAS

Felicola (Felicola) rohani Werneck, 1956

Felicola rohani. Werneck, 1956, *Rev. brasil Biol.* **16** : 25, figs. 1-5.

From *Herpestes auropunctatus siamensis* (Kloss), Khorat City, Thailand, 12.ii.1953, R. E. Elbel : 14 ♂, 13 ♀.

From *Herpestes auropunctatus siamensis*, Boekphrai, Banpang, Rat Buri, Thailand, 10.v.1952, Banpang Plague Lab.: 1 ♂, 1 ♀.

From *Herpestes auropunctatus siamensis*, Banpang, Rat Buri, Thailand, 29.iv.1952, R.E. Elbel : 2 ♂.

From *Herpestes auropunctatus siamensis*, Chaiyaphum, Phukhieo, Non Khun, Thailand, 11.xii.1952, R. E. Elbel : 5 ♂, 3 ♀.

The host-record is a new one, since Werneck's material was obtained in Mauritius from the introduced *Herpestes edwardsi edwardsi* (Geoffroy), but I can find no significant difference between the present specimens and those described by Werneck and depicted in his excellent figures. There is, however, one interesting difference between these specimens and the type lot : Werneck's fig. 4, apparently drawn from an unmounted specimen, shows the tips of the endomeres inclining outwards, while in his fig. 5 the apical portion of the endomeres is twisted and the tips point inwards ; he regards the latter condition as an abnormality, though noting that it is frequent (there were 4 males in the type series). But in the present series the endomeres are twisted in such a way that their tips incline inwards in 20 of the 21 specimens, while in the remaining male they are badly damaged and I cannot tell their true shape. It seems, therefore, that the twisted condition of the endomeres is the normal one.

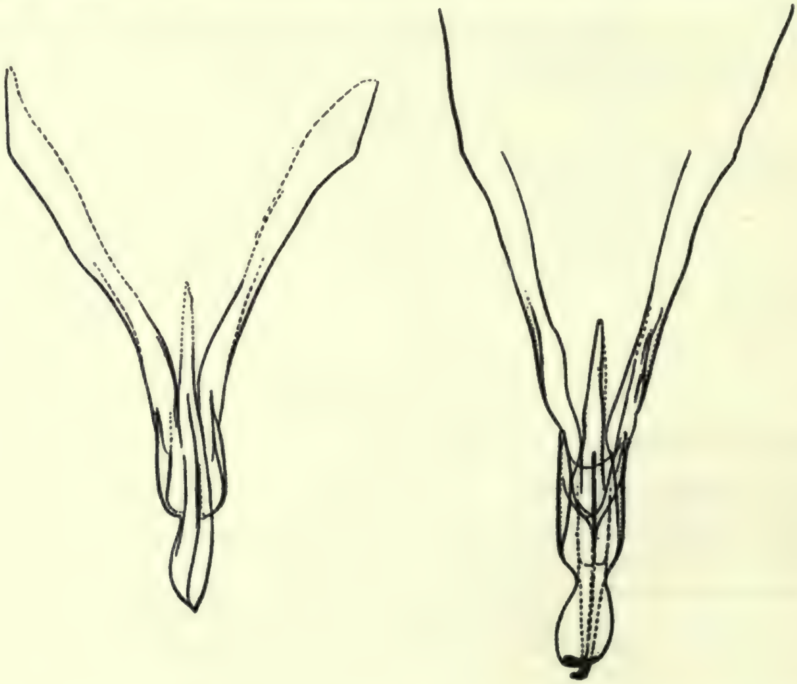
Felicola (Protelicola) intermedius hyaenae ssp. nov.

Text-fig. 10; Pl. 2, figs. 3, 4

From *Hyaena brunnea* Thunberg (Brown Hyaena), Palapye, Bechuanaland, 26.v.1957, G. Theiler: the ♂ holotype.

From *Hyaena brunnea*: Kukong, southern Bechuanaland, about half-way between Kanye and Tsane (between 24° and 25° S. and about 23° E.), 29.xi.1957, received from Dr. F. Zumpt: the ♀ allotype, 1 ♂ paratype and 1 nymph.

Very like *F. i. intermedius* (Bedford, 1932) (*Parasitology* **24**: 355, figs. 1c, 2) but averaging larger, the preantennal portion of the head with more convex margins (contrast Pl. 2, figs. 1 and 3, 2 and 4) and with slight differences in the male genitalia (Text-fig. 10, contrast Text-fig. 9). A very striking difference in the male genitalia is the much greater divergence of the sides of the basal apodeme in the nominate subspecies (Text-fig. 9) but as I have seen only one male of this form there is some possibility that the difference is due to the accidents of mounting.



Figs. 9, 10. Genitalia of male *Felicola intermedius* sspp.: 9. *F. i. intermedius* (Bedford), male from type-series. 10 *F. i. hyaenae* ssp. nov., holotype.

I am much indebted to Dr. Zumpt for the opportunity to see this material and to Mr. R. du Toit, Veterinary Research Laboratories, Onderstepoort for the loan of that portion of the type-series of *F. intermedius* Bedford (one male, two females and a nymph) which is in the Onderstepoort collection. I have also examined two South African females, from the same host-species, in my own collection.

This is the first record of any member of the Phthiraptera from a hyaena and is of special interest because it has been suggested (Hopkins, 1949, *Proc. zool. Soc. Lond.* **119** : 506) that hyaenas might be louse-free ; the apparent anomaly of absence of lice on a major taxon of the Fissipeda (or land-Carnivora) is now shown to be illusory. The host of *Felicola i. intermedius* is *Proteles cristatus*, the sole member of the other extant subfamily of the Hyaenidae.

Trichodectes (Trichodectes) emersoni sp. nov.

Text-figs. 11–13 ; Pl. 1, fig. 4 ; Pl. 2, figs. 5, 6

From *Helictis orientalis everetti* Thomas, Kamborangah, Mt. Kinabalu, North Borneo, 7.vi.1952, Anglo-Amer. Med. Res. Unit : the ♂ holotype, ♀ allotype and 3 ♀ paratypes.

From *Helictis orientalis everetti*, Tenompak, Mt. Kinabalu, North Borneo, 8.vii.1951, Anglo-Amer. Med. Res. Unit : 3 ♂, 6 ♀ paratypes, 1 nymph.

From *Helictis orientalis everetti*, Tenompak, Mt. Kinabalu, North Borneo, 20.viii.1953, Anglo-Amer. Med. Res. Unit : 12 ♂, 25 ♀ paratypes, 3 nymphs.

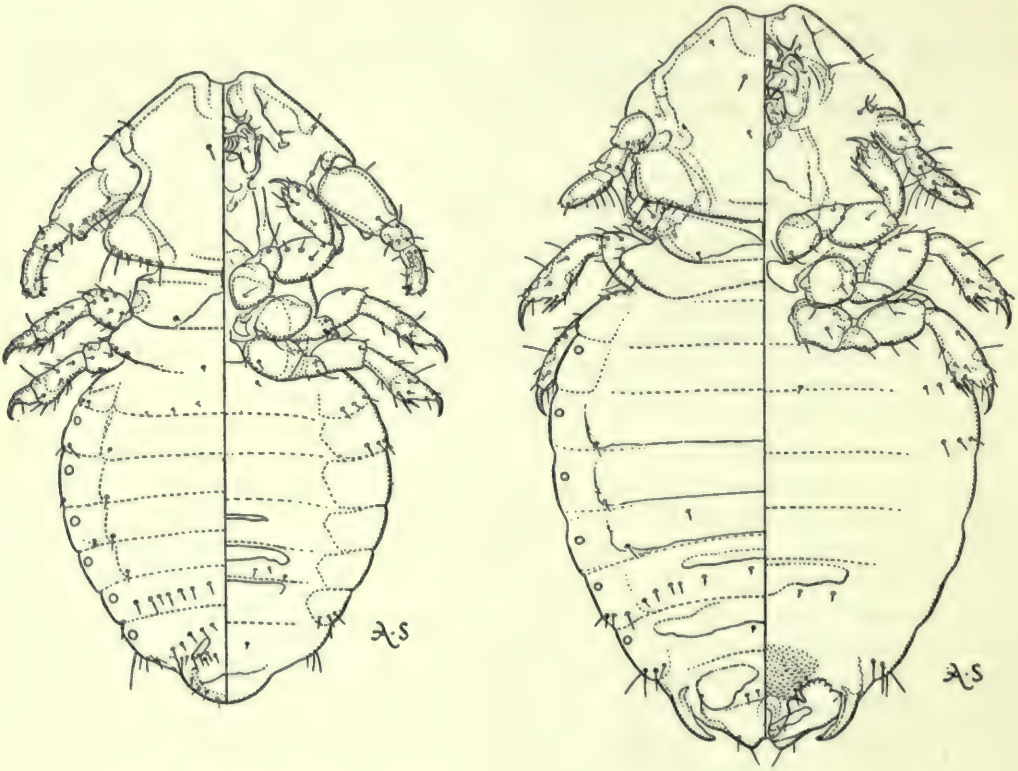
The taxonomy of the Trichodectidae at the generic and subgeneric level constitutes one of the more difficult problems in the systematics of the Mallophaga, and the present species adds to the difficulty. Within the mass of species found on Fissipeda there are various groups, of which *Felicola* Ewing 1929 is (as exemplified by its type species and the nearest relatives of the latter) one of the most distinct from the more characteristic species of *Trichodectes* Nitzsch, 1818. Unfortunately, however, there are so many species which show deviations from the characteristics of the more typical members of both groups that, in his comprehensive and excellent revision of the Trichodectidae, Werneck (1948, *Os Malófagos de Mamíferos*, part 1) has been forced to utilize the generic name *Suricatoecus* Bedford, 1932 (incapable of exact definition) for a miscellany of species which link *Trichodectes* s.str. with *Felicola* s.str. and which cannot be confidently referred to either group, even after allowing generously for deviations like the presence of six pairs of abdominal spiracles in *F. caffer* (Bedford) (a species which is very closely related to others in which the number of pairs of abdominal spiracles is either three or none).

Trichodectes emersoni fits fairly well into *Trichodectes* s.str., but the reduced chaetotaxy, presence of sclerotized tergal plates, and the moderately salient tip of the abdomen in the male are suggestive of *Felicola* and it might very well have been included in *Suricatoecus*. The sclerotic bands of the abdomen are particularly reminiscent of *S. decipiens* (Hopkins), from which *emersoni* differs greatly in other respects.

Head slightly wider than long in both sexes (index 0·76 in holotype, 0·80 in allotype) its anterior margin with a wide but not very deep osculum, sides of pre-antennal portion of head almost straight. Antenna very large in male, the first segment subequal in length to the other two together, much smaller in the female and segment

I shorter than III. Bristles of dorsum of head very few and small apart from a row of six, along the hind margin, which includes a few slightly larger ones.

Abdomen oval, broadest at fourth (apparent third) segment, slightly longer than wide (index 1·14 in holotype, 1·07 in allotype), with 6 pairs of spiracles. Bristles few and very small, placed as shown in Text-figs. 11 and 12. Weakly sclerotized plates present on the dorsum of the penultimate segment in both sexes (this plate widely interrupted in the middle), on the venter of segments 5–7 in the male and on the dorsum of segments 7–9 and venter of segment 7 in the female. Male with last segment of abdomen forming an almost semicircular rounded prominence. Male genitalia as in Text-fig. 13, the basal apodeme tapering cephalad and probably ending in a point, parameres not forming a ring but giving the impression that they are probably joined in the middle line by an unsclerotized portion, endomeres with very sharp tips, spicules of copulatory sac coarse, those near the middle line (when the sac is retracted) about twice as large as the rest.



FIGS. 11, 12. *Trichodectes emersoni* sp. nov.: 11. Holotype. 12. Allotype.

Length of holotype 1·08 mm., of allotype 1·26 mm. Holotype male and allotype female in the United States National Museum.

T. emersoni (which I have named in honour of Col. K. C. Emerson, from whom I received the material) is the first species of Mallophaga to be recorded reliably from *Helictis,* though Neumann (1913, *Arch. Parasit., Paris* **15** : 618) purported to recognize as *Trichodectes* (*Neotrichodectes*) *mephitidis* Osborn " un jeune individu recueilli sur *Helictis Emeretti* au Muséum d'Histoire naturelle de Paris ", which may perhaps have been a nymph of *emersoni*. In spite of important differences, *T. emersoni* is perhaps nearest related to *T. melis* (O. Fabricius) and *T. vosseleri* Stobbe, which also parasitize members of the Melinae.

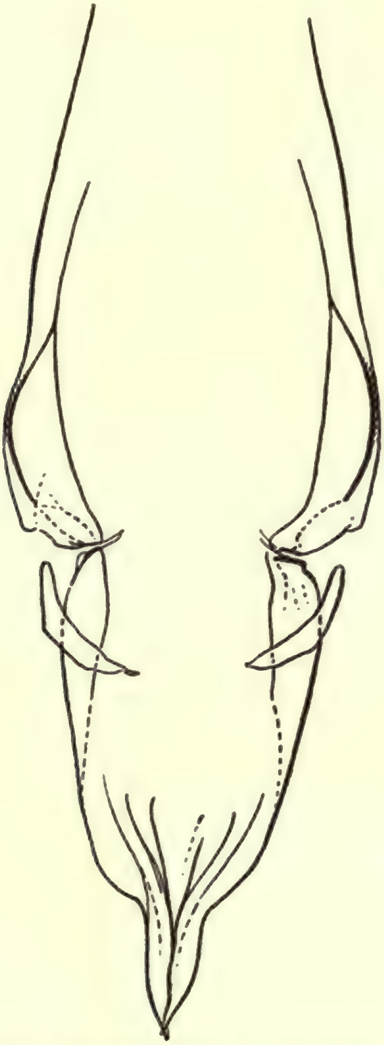


FIG. 13. Genitalia of male holotype of *Trichodectes emersoni* sp. nov.

PLATE 1

FIG. 1. *Felicola* (*Felicola*) *spenceri* sp. nov., male holotype.

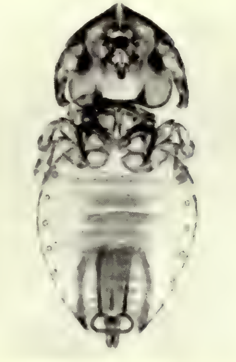
FIG. 2. *Damalinia* (*Bovicola*) *sedecimdecembrii* (Eichler), male from *Bison bison.*

FIG. 3. *Damalinia* (*Bovicola*) *sedecimdecembrii* (Eichler), female from *Bison bison.*

FIG. 4. *Trichodectes* (*Trichodectes*) *emersoni* sp. nov., male genitalia to show spicules of copulatory sac.

FIG. 5. *Damalinia* (*Bovicola*) *ovis* (Schrank), male neotype.

FIG. 6. *Damalinia* (*Bovicola*) *oreamnidis* sp. nov., male holotype.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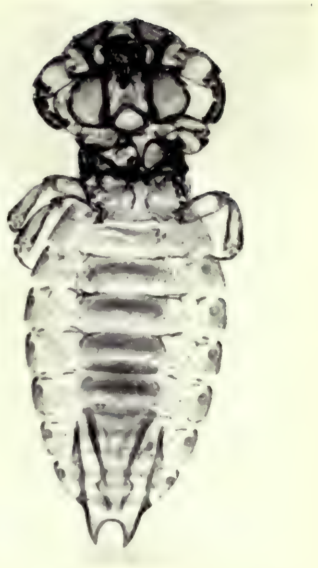
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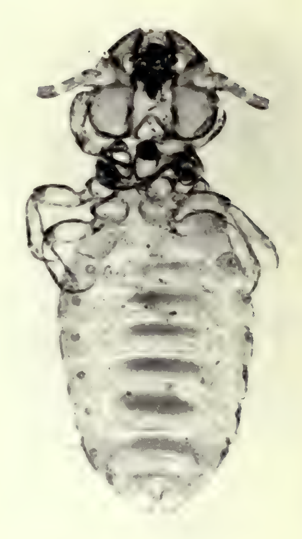
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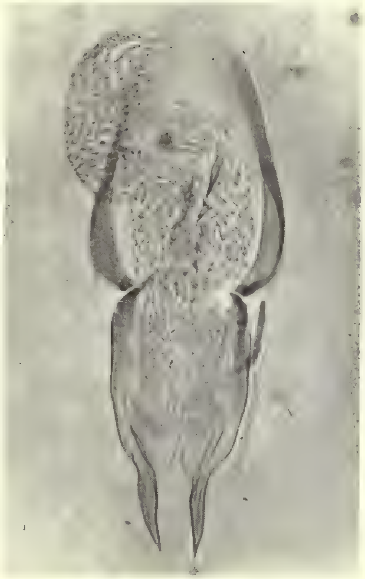
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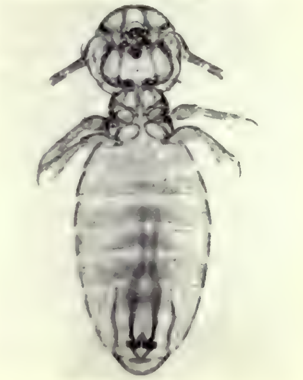
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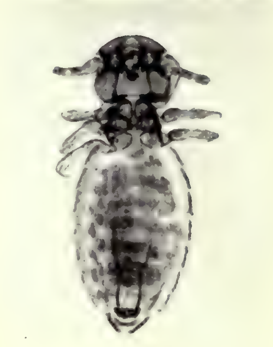
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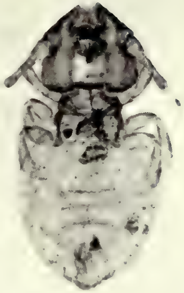
PLATE 2

FIG. 1. *Felicola* (*Protelicola*) *intermedius intermedius* (Bedford), male from type series.
FIG. 2. *Felicola* (*Protelicola*) *intermedius intermedius* (Bedford), female from type series.
FIG. 3. *Felicola* (*Protelicola*) *intermedius hyaenae* ssp. nov., male holotype.
FIG. 4. *Felicola* (*Protelicola*) *intermedius hyaenae* ssp. nov., female allotype.
FIG. 5. *Trichodectes* (*Trichodectes*) *emersoni* sp. nov., male holotype.
FIG. 6. *Trichodectes* (*Trichodectes*) *emersoni* sp. nov., female allotype.



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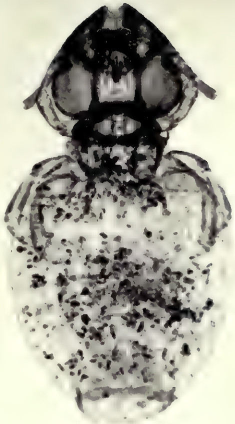

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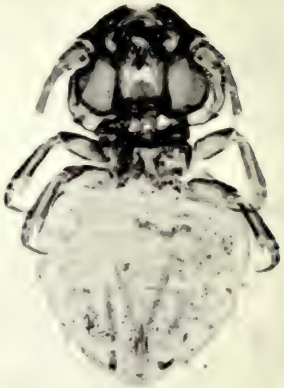

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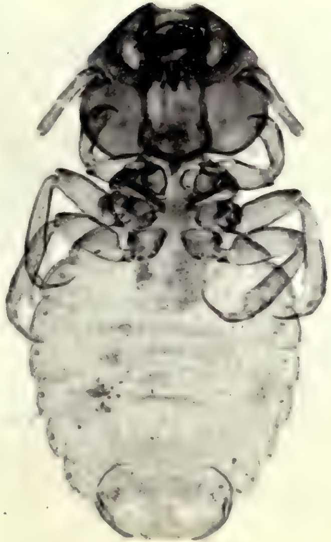

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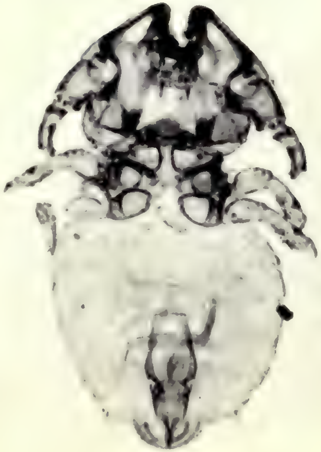

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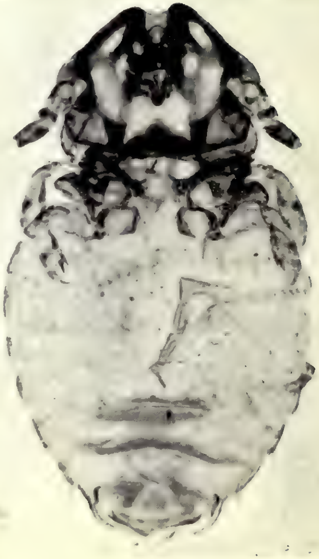

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1. *COTACHENA HISTRICALIS* WALKER
2. *SYNGAMIA FLORIDALIS* ZELLER

BRITISH MUSEUM
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NATURAL HISTORY

PAUL E. S. WHALLEY

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1. THE *HISTRICALIS* COMPLEX OF THE GENUS *COTACHENA* MOORE (LEP., PYRALIDAE)

BY

By PAUL E. S. WHALLEY

INTRODUCTION

THE genus *Cotachena* was erected by Moore (1885) for the species *Botys histricalis* Walk. The genus was subsequently placed (e.g. Hampson, 1896) in the Endotrichiinae, but recently Inoue (1955) has placed it correctly in the Pyraustinae. The actual relationships with other genera in the Pyraustinae still remains to be worked out.

Walker (1859) described *Botys histricalis* from Ceylon. He also mentions two other specimens " ? female " from China and Shanghai.

Butler (1887) described a new species in the genus, *Cotachena trinotata*, from Alu in the Solomon Islands.

Snellen (1890) records *histricalis* from Sikkim but transfers it to the genus *Stenophyses* Led. The type of this genus is *serinalis* Walk. and it is generically distinct from *histricalis*.

Ragonot (1891) uses *Cotachena histricalis* Walk. as the species and was the first to place it in the Endotriichinae but he comments on its similarity to some Pyraustinae.

Warren (1892) describes *Archernis pubescens* from N. India and China. In 1896 he described *Cotachena peractilis* from Dili and Tenimber.

Hampson (1896*a*) gives an account of *C. histricalis* Walker and puts the Chinese and N. Indian specimens as " race *pubescens* Warren ". Later in the same year (1896*b*) he gave the following synonymy of the *Cotachena* complex and retained it in the Endotrichiinae.

1. ***Cotachena histricalis*** Walk. List Lep. Ins. B.M., XVIII, p. 655, 1859

Synonym *Archernis pubescens* Warr. *A.M.N.H.* (6) IX, p. 300, 1892.

2. ***Cotachena trinotata*** Butl. A.M.N.H. (5) XX, p. 122

Synonym *C. peractilis* Warr. *A.M.N.H.* (6) XVII, p. 465, 1896.

Subsequently Rothschild (1916) described a subspecies *orientalis* of *histricalis* Walk. The types of all these species are in the British Museum (Natural History). I have compared them and examined long series of each species. As a result the synonymy is as follows :—

Cotachena histricalis Walk.

C. peractilis Warr. ***syn. nov.***
C. trinotata Butl. ***syn. nov.***
C. histricalis orientalis Rothsch. ***syn. nov.***

Cotachena pubescens Warren

Cotachena alysoni *sp. nov.*

Cotachena histricalis Walker

(Pl. 3, 1–4; Text-figs. 1*a*, 1*b*, page 102)

Botys histricalis Walk. *List Lep.*, p. 655, 1859. *C. trinotata* Butler. *A.M.N.H.* (5) XX, p. 122, 1887. *C. peratilis* Warren. *A.M.N.H.* (6) XVII, p. 465, 1896. *C. histricalis orientalis* Rothsch. *Rep. B.O.U. Ex.p.* 2, no. 15, p. 117, 1916. *Archernis pubescens* Warren, Hampson not Warren. *Trans. ent. Soc.*, p. 498, 1896. *C. histricalis pubescens* Warren, Inoue not Warren. *Check List Jap. Lep*, pt. 2, p. 159, 1955. *Stenophyses histricalis* Walker, Snellen (?) not Walker. *Trans. ent. Soc.*, p. 600, 1890.

Type ♂ " Ceylon " in B.M.

This is a very widespread and variable species but it is difficult to separate any definite trend in any region. The Pacific Island species tend to be larger with a more prominent coremata than the Ceylon specimens, but some of the Pacific specimens are identical with those from Ceylon.

Australian specimens tend to be rather greyer than the Ceylon-Pacific specimens but the differences are slight. On some Pacific Islands (e.g. Ysabel) a dark yellow form occurs. This is " *C. trinotata* Butler ". It occurs in a number of islands and is merely an aberration.

While some of the Pacific Island specimens are smaller than the " typical " Pacific form, the genitalia and wing pattern are all identical and further naming of subspecies is not thought necessary.

Genitalia : ♂ Text-fig. 1*a* ; ♀ Text-fig. 1*b*, page 102.

GEOGRAPHICAL DISTRIBUTION : Ceylon, India, Burma, Malaya, Philippines, Hainan, Talaut, Java, Sumatra, Borneo, Sarawak, Celebes, Moluccas, New Guinea, Vulcan I., Australia, Solomon I., Bismarck Archipelago, Louisade Archipelago.

Cotachena pubescens Warren

(Pl. 3, 5; Text-figs. 2*a*, 2*b*, page 103)

Archernis pubescens Warr. *A.M.N.H.* (6) IX, p. 300, 1892. *C. histricalis* Walk. auctt. *C. histricalis pubescens* Warr. auctt.

Lectotype ♂ " Dharmsala N. India " in B.M.

Walker (1859) first noticed that the Chinese and N. Indian specimens were smaller and darker than *histricalis* Walk. Warren described these specimens as a new species but it has subsequently either been regarded as a synonym (Hampson, 1896) or a subspecies (Inoue, 1955). The genitalia of the male are quite distinct from those of the male *histricalis*.

There is a considerable amount of variation in the intensity of the coloration, the Formosan and Japanese specimens being paler than the Indian ones. Specimens which are probably this species from Borneo and Malaya are darker than the Indian race with less yellow on the fore wings.

Genitalia : ♂ Text-fig. 2*a* ; ♀ Text-fig. 2*b*, page 103.

GEOGRAPHICAL DISTRIBUTION : India, Malaya, China, Korea, Japan, Hainan, Formosa, Borneo, Oinainisa (S.W. Timor).

Cotachena alysoni sp. nov.

(Pl. 3, 6; Text-fig. 3*a*, page 104)

C. histricalis Walk. partim auctt. *C. histricalis pubescens* Warr. partim auctt. ? *Stenophyses histricalis* Walk., Snellen. *Trans. ent. Soc. Lond.*, p. 600, 1890.

Type ♂ " Chang Yang, A. E. Pratt Coll. May 1888 " in B.M.

Pyral. genit. slide No. 4129.

♂. Wing 10 mm. (Centre of thorax to apex of wing). Head light sandy brown. Thorax yellowish brown.

Fore wing : Fringe yellow ochre with brown line through centre. Terminal line black with minute yellow spots at apex of each vein. Terminal area yellow ochre, narrowing posteriorly, becoming brown. Three hyaline areas (see plate) edged with black on outer and inner edges. From the middle patch a small hyaline line extends to the hind margin of the fore wing. Rest of fore wing sepia. Sub-basal line continuous with black inner edge of inner hyaline patch. Costal margin sepia along basal two thirds. Yellow opposite outer hyaline patch. Apical part of costal margin black.

Hind wing : General colour yellow ochre. Four small sepia marks indicate ante- and post-medial lines.

Underside, similar, paler.

♀. Unknown.

Genitalia : ♂, Text-fig. 3*a*, page 104.

MATERIAL EXAMINED : CHINA, 1 ♂, Chang Yang (type) ; 3 ♂, Ding Manon (Bailey), 1911 (paratypes) ; 1 ♂ ,Chang Yang (Pratt) (paratype) ; 3 ♂, Chungking (Barry), 1912 (paratypes) : SIAM, 2 ♂, Musklik, 1,000 ft. (Fruhstorfer) : INDO CHINA, 1 ♂, Laos, Muang Awm, 900 m., 1932 : MALAY PENINSULA, 1 ♂, Perak (Pendlebury), 1925 ; 1 ♂, Mt. Tahan (Waterstradt) : INDIA, 4 ♂, 1 ♀, Sikkim (Moller), 1886 (paratypes) ; 1 ♂, Sikkim (Pilcher, 1895, (paratype) ; 1 ♂, Sikkim (B.M.), 1895 (paratype) ; 3 ♂, Darjeeling (paratypes) ; 2 ♂, Khasis Hills (paratypes) ; 1 ♂, Shillong (paratype) ; 1 ♂, Naga Hills, 5,000–7,000 ft., Doherty, 1889 (paratype) ; 2 ♂, Mishmi Hills, Lolit River (Steele), 1935 (paratypes) : JAPAN, 1 ♂, Takao San (Inoue), 1950 (paratype), (in Coll. H. Inoue).

This species is very close to the other species of *Cotachena* but is primarily separated in the male by the blunt uncus.

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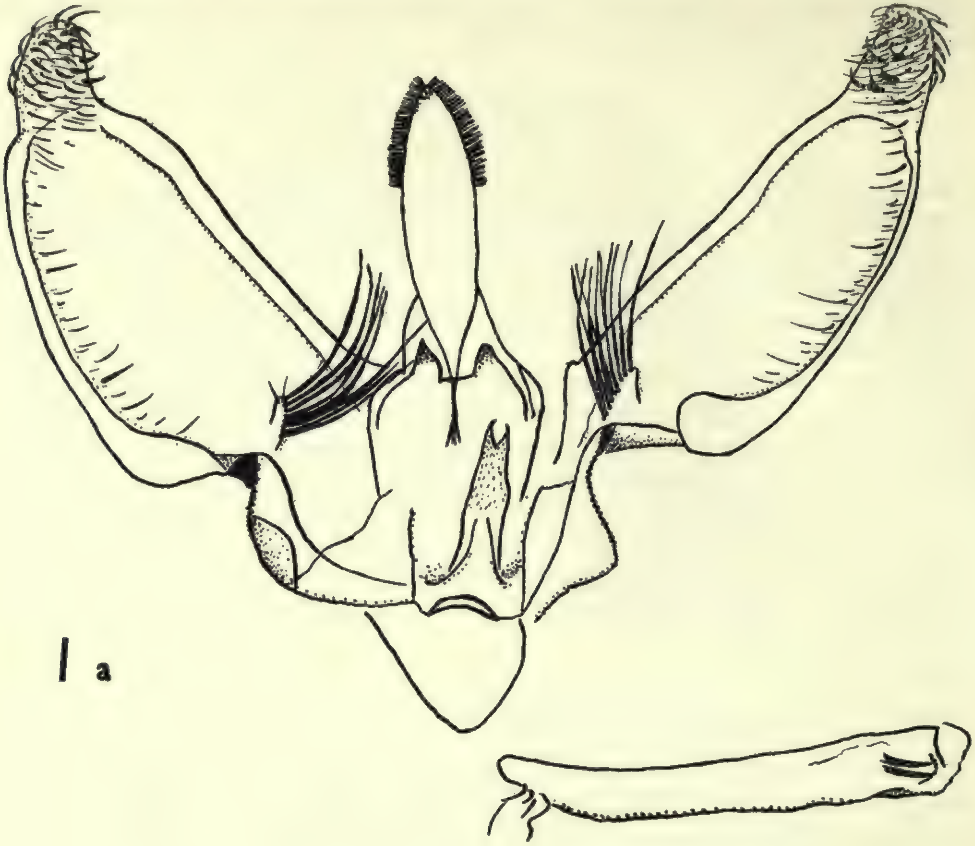
—— 1896. *Ibid.* (6) **17** : 465.



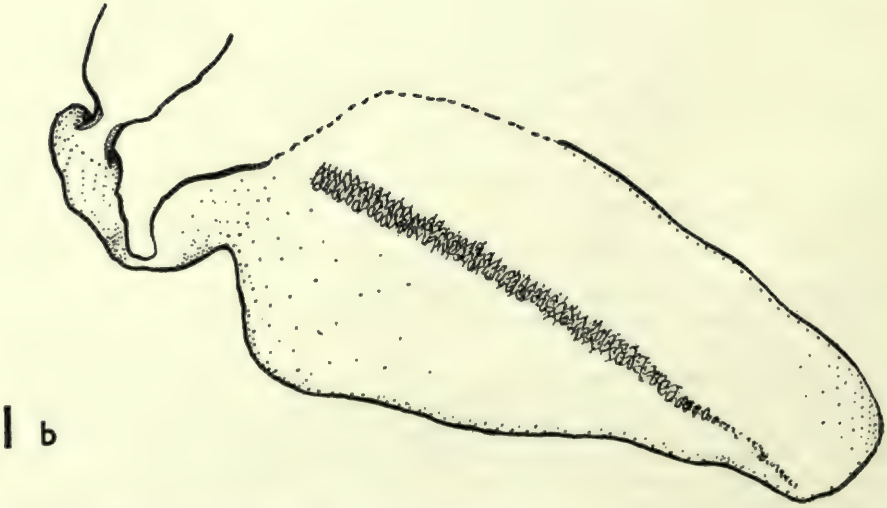
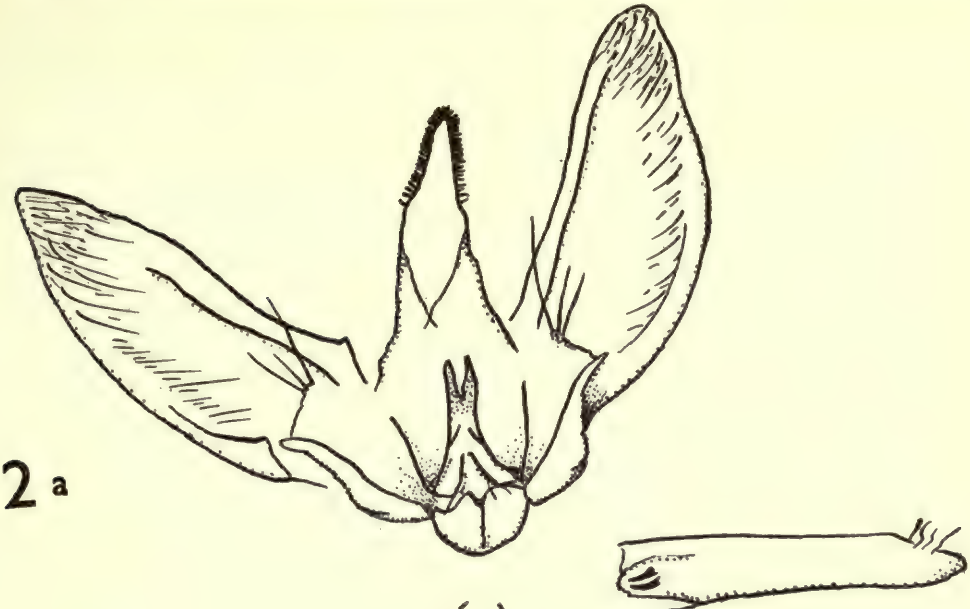


FIG. 1*a*. *Cotachena histricalis* Walk., ♂ genitalia, type.
FIG. 1*b*. *C. histricalis* Walk., ♀ Bursa copulatrix and duct.



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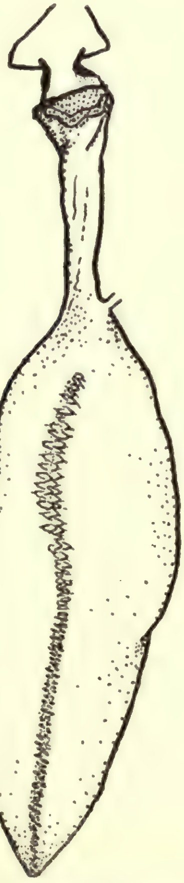
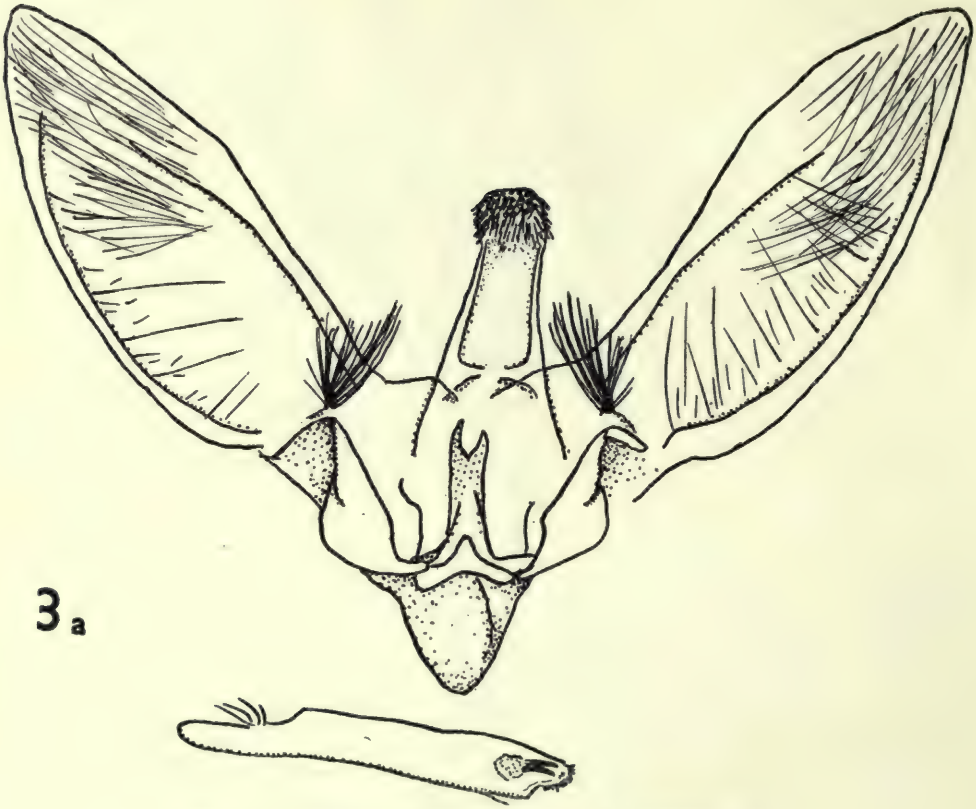


2b

FIG. 2*a*. *Cotachena pubescens* Warr., ♂ genitalia, Lectotype.
FIG. 2*b*. *C. pubescens* Warr. ♀ Bursa copulatrix and duct.

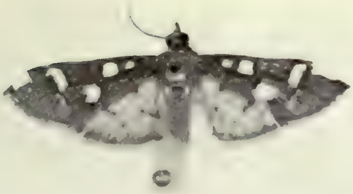


3a

FIG. 3*a*. *Cotachena alysoni* sp. nov., ♂ genitalia, type.

PLATE 3

FIG. 1. *Cotachena histricalis* Walk., type ♂, Ceylon.
FIG. 2. *C. histricalis* Walk., ♂, Solomon Islands.
FIG. 3. *C. histricalis* Walk., ♀, Solomon Islands.
FIG. 4. *C. histricalis* Walk., ♀, Solomon Islands (*C. trinotata* Butl.).
FIG. 5. *C. pubescens* Warr., ♂, Khasis, N. India.
FIG. 6. *C. alysoni* sp. nov., type ♂, Chang Yang, China.
(All × 2.)



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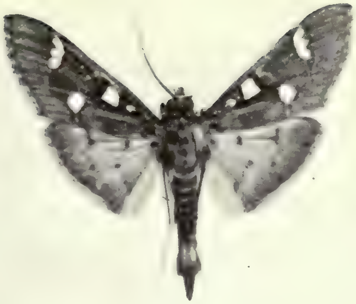

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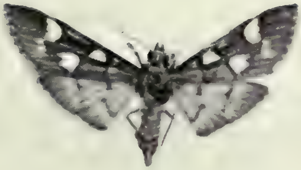

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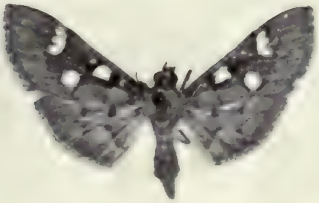

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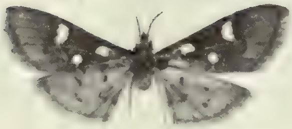

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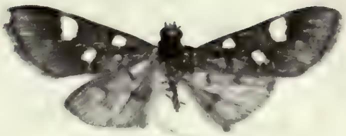

6

2. A REVISION OF THE *SYNGAMIA FLORIDALIS* ZELL. COMPLEX WITH THE DESCRIPTION OF A NEW SPECIES

By PAUL E. S. WHALLEY

INTRODUCTION

Syngamia floridalis Zell. is an omnibus name used for specimens from Africa to Australia. Although seven different species had been described in this complex they were all synonymized by Hampson (1898). He gave the synonymy :—

Syngamia floridalis Zell.

synonym *Glyphodes calidalis* Guen.
,, *Syngamia octavialis* Walk.
,, *S. merionealis* Walk.
,, *S. tiphalis* Walk.
,, *S. secutalis* Walk.
,, *Hyalea fulvidalis* Wallengr.
,, *Botys witalis* Feld.

Recently I have been examining specimens of "*floridalis*" from a collection made by Mr. J. D. Bradley on the Solomon Islands in 1953. These specimens clearly did not agree with the Zeller type. In order to identify these specimens I have examined all the available material of this complex. The type of *G. calidalis* Guen. has been lost. I have, however, examined a specimen from the Ragonot collection, kindly lent by Mr. P. Viette, Paris, which had been compared with Guenée type by Ragonot. I have selected this specimen as the neotype (see later). I have not seen the type of *H. fulvidalis* Wallengr. but have examined a long series from the type locality (Tahiti). All the other types were examined together with the type of *Syngamia aurantiaca* Hamps.

As a result of this examination it was found that in fact there are three distinct species. It also became apparent that the "*floridalis*" complex was not congeneric with *Syngamia florellalis* Cr. the type of *Syngamia* Guen. Two genera were used by Lederer (1863), *Aethalöessa* and *Chnaura* (Wien. ent., p. 435, 1863). The former (type *floridalis* Zell.) has page preference over the latter (type *octavialis* Walk.) The species should thus be referred to the former genus.

Aethalöessa floridalis Zell. (**comb. nov.**). Type of genus

Syngamia floridalis Zell., *Lep. Caffr.* 60, 1852 : *S. merionealis* Walk., *List Lep.* **17** : 334, 1859 : *Aethalöessa floridalis* Walk., Lederer, *Wien. ent. mon.* 435, 1863.

Type ♂ " Natal " in B.M. Pl. 4, fig. 1.

This species is restricted to Africa and Madagascar. Specimens from Madagascar tend to be smaller than those from the mainland, however the mainland specimens themselves also vary considerably in size. Further material may show some subspeciation over Africa. The shape of the cornutus in the ♂ genitalia is characteristic.

Genitalia : ♂ Text-fig. 1*a*. ♀ Text-fig. 1*b*, pages, 109 and 111.

DISTRIBUTION : Africa ; S. Africa, Fernando Po, Angola, Kenya, Uganda, Cameroons, Sierra Leone, Nigeria, Ghana, Belgian Congo. Madagascar ; Diego Suarez.

Aethalöessa calidalis calidalis Guen. (**comb. nov.**)

Glyphodes calidalis Guen., Delt. et Pyr. 294, 1854 : *Chnaura octavialis* Walk., Lederer, *Wien. ent. mon.* 435, 1863 : *Syngamia floridalis* Zell., Hampson *nec* Zeller, *Proc. ent. Soc.* 644, 1898 : *S. floridalis auctt.*

Type lost. Neotype selected from Ragonot collection labelled : " Indes orient. calidalis Gn (Glyph.) =*Chnaura octavialis* Walk., vue le type au M.N." in Paris museum. Pl. 4, fig. 2.

This species is found in India and Ceylon. The main cornutus in the aedeagus is shorter and blunter than in specimens from the Australasian–Pacific region and there are some differences in the female genitalia (see Text-figs. 1*b* and 2*b* page 111).

Genitalia : ♂ Text-fig. 2*a*. ♀ Text-fig. 2*b*. Pages 109 and 111.

DISTRIBUTION : Indian Subcontinent ; North and South. Ceylon, Seychelles.

Aethalöessa calidalis tiphalis Walk. (**comb. nov.**)

Syngamia tiphalis Walk., *List Lep.* **17** : 335, 1859 : *S. secutalis* Walk., *List Lep.* **34** : 1291, 1865 : *Hyalea fulvidalis* Wallengr., *Wien. ent. mon.* 174, 1860 : *Chnaura octivialis* Walk., Led., *Wien. ent. mon.* 435, 1863 : *Botys witalis* Feld., *Reis. Nov.* pl. 135, f. 8, 1864–67 : *Syngamia aurantiaca* Hmpsn., *Ann. mag. Nat. Hist.* **9** : 254, 1912, **syn. nov.** : *S. floridalis* Zell., Hamps. *nec* Zell., *Proc. ent. Soc.* 644, 1898 : *S. floridalis auctt.*

Type ♂ " Celebes " in B.M. Pl. 4, fig. 3.

This subspecies ranges from Malaya to Australia with very little variation in the male genitalia. Slight variation occurs in wing pattern and colour intensity, but this cannot be related to any geographic area.

Genitalia : ♂ Text-fig. 3*a*. ♀ Text-fig. 3*b*. Pages 110 and 111.

DISTRIBUTION : Malaya, Burma, Formosa, Java, Sumatra, Borneo, Celebes, New Guinea, Solomon I., New Ireland, New Britain, Bali, Ceram, Sudest I., Rook I., Tambora, Philippines, Samoa, Tahiti, Tenimber, Warri, Australia (Queensland and New South Wales).

In some of the Pacific Islands, this subspecies flies alongside the next species.

Aethalöessa rufula sp. nov.

Syngamia floridalis Zell., Hampson *nec* Zell., *Proc. ent. Soc.* 644, 1898 : *S. floridalis auctt.*

Type ♂. " Arawa, N. Bougainville (Solom. I.), Dec. 1907 " in B.M. Pyral. Genitalia Slide No. 6002. Pl. 4, fig. 4.

♂. Wingspan 12–15 mm. Head, crown yellow, antennae long, filiform. Thorax brown. Abdomen orange-yellow, last two or three segments brown.

Fore wings : General colour orange-red with brown edges. Costal margin, apex and terminal margin brown, apical brown part broad. From half-way along costa brown projections extend backwards towards similar brown projections from hind margin. These two may meet in some specimens giving a round orange-red area separated by a brown band from basal and sub-basal part. Small brown projection from costa one third from base, rarely reaching hind margin. Basal area brown.

Hind wings : Terminal and subterminal area brown, broad anteriorly, narrowing posteriorly. Small brown median spot on anterior margin of hind wing. Rest of wing orange-red. Small indistinct brown spot on hind margin.

FEMALE. Similar.

Genitalia : ♂ Text-fig. 4*a*. ♀ Text-fig. 4*b*. Pages 110 and 111.

MATERIAL EXAMINED. Solomon I., 6 specimens Renell I. (J. D. Bradley) 1953 ; 9 specimens Arawa, Bougainville, May 19 04(Meek) ; 6 specimens Guadalcanal v.01 (Meek) ; 8 specimens Nissen I. Aug. 24 (Eichhorn) ; 2 specimens Vella Lavella (Meek), 1908 ; 5 specimens Rendova (Meek). St. Aignans, 7 specimens Oct. 1897. Buru, 3 specimens. Kayeli, 2 specimens '97 (Doherty). Little Kei, 5 specimens (H. Kuhn). Teoor, 2 specimens (H. Kuhn). Sudest I., 5 specimens Feb. 1916 (Eichhorn bros.). St. Matthias, 9 specimens June 1923 (A. F. Eichhorn). New Hannover, 12 specimens March–April 1923 (Meek). Amboyna, 11 specimens (Doherty), 1892. Rossell I., 1 specimen March 1898 (Meek). Tobriand I., 3 specimens. Kiriwini, 2 specimens iii.95 (Meek). Banks I., 1 specimen. Dampier I., 6 specimens Feb. 1914 (Meek). Squally I., 2 specimens (A. F. Eichhorn). Admiralty I., 5 specimens Sept.–Oct. 1913 (Meek). Gt. Kei, 2 specimens 4.v.98 (H. Kuhn). Fergusson I., 10 specimens x.94 (Meek). Fenni I., 8 specimens May 1924 (A. F. Eichhorn). Witu, 9 specimens June 1925 (Eichhorn). New Hebrides, 5 specimens (Cheesman) 1929. Woodlark I., 1 specimen (Meek) iv.97. New Guinea : 2 specimens Milne Bay i.99 ; 4 specimens Kumusi R., June, 1907 ; 6 specimens Upper Aroa R., March 1903 (Meek) ; 2 specimens Kapaur, 1896 (Doherty) ; 6 specimens Upper Setakwa R. Snow Mts. 2–3000 ft. 1919 (Meek). Celebes ; 1 specimen reg. basse entre Maros et Tjamba (Doherty) 1896.

This species is easily distinguished externally from *calidalis* Guen. and its subspecies by the lack of the black scales on the dorsal side of the first abdominal segment. Some variation in pattern of the wings of this species may occur. The small brown dots on the anterior and posterior margin of the hind wing may form part of a broken brown line which is continued on to the fore wing. This species is closely related to *A. calidalis* Guen.

KEY TO THE MALES OF THE SPECIES OF *Aethalöessa*

1.	First abdominal segment black or brown dorsally	2
	First abdominal segment not black	*rufula*
2.	Main cornutus in aedeagus bent at both ends (Text-fig. 1*a*)	*floridalis*
	Main cornutus straight	3
3.	Main cornutus short and broad (Text-fig. 2*a*)	*calidalis calidalis*
	Main cornutus elongate (Text-fig. 3*a*)	*calidalis tiphalis*

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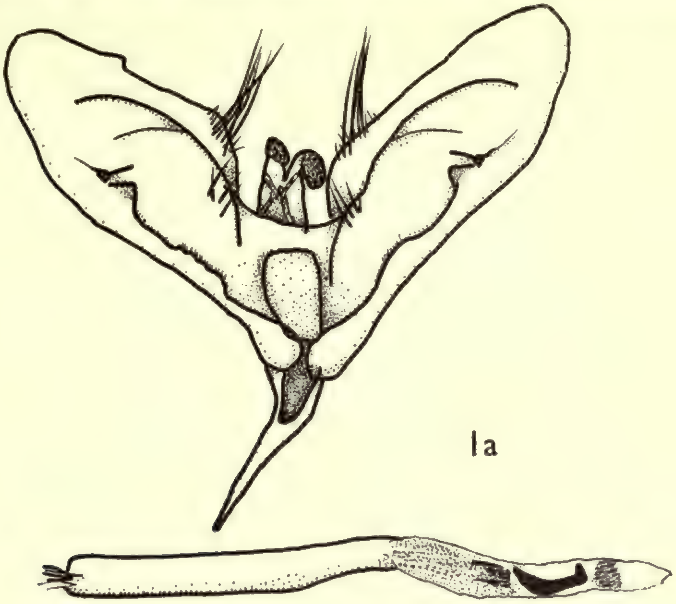
BRITISH MUSEUM
19 JAN 1961
NATURAL HISTORY



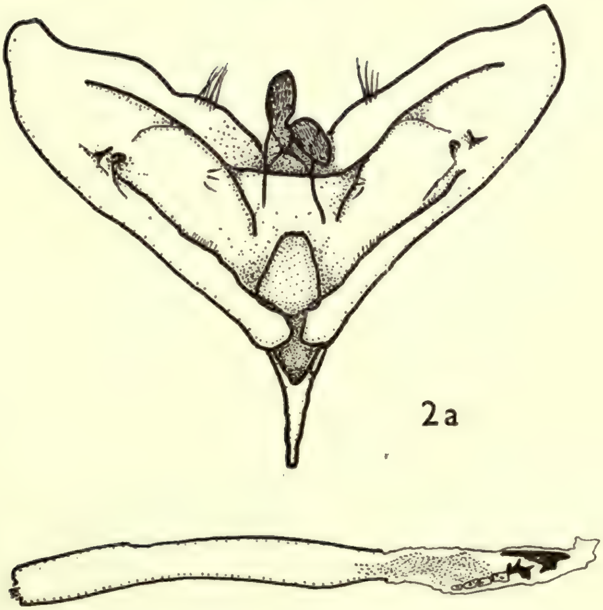
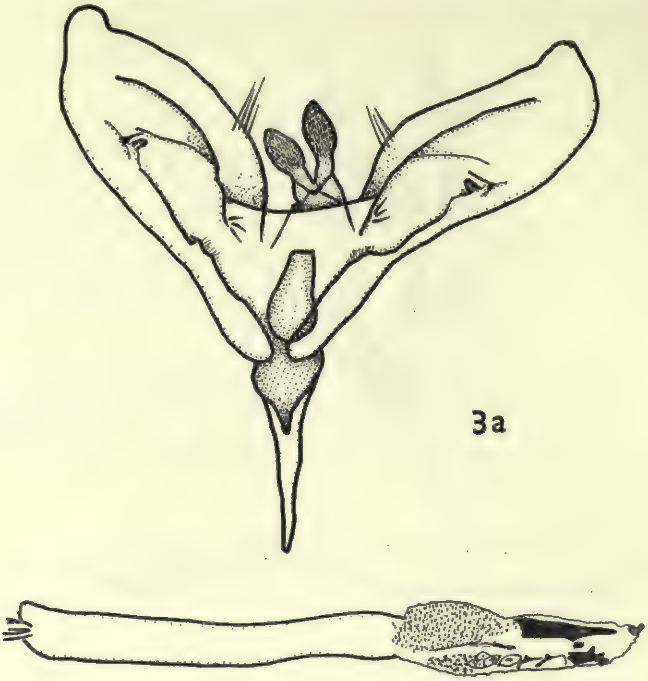


FIG. 1*a*. *Aethalöessa floridalis* Zell., ♂ genitalia.
FIG. 2*a*. *A. calidalis calidalis* Guén., ♂ genitalia.



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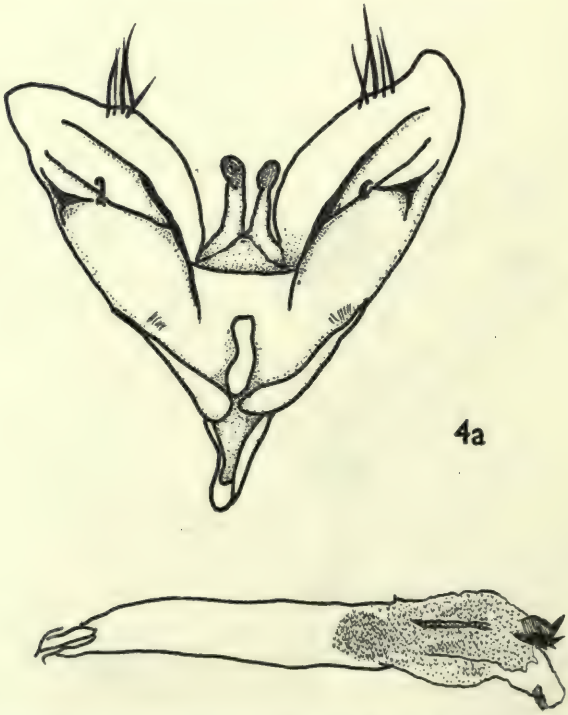
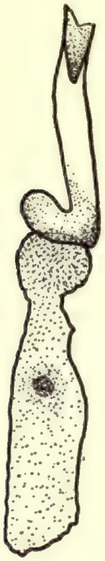


4a

Fig. 3*a*. *Aethalöessa calidalis tiphalis* Walk., ♂ genitalia.
Fig. 4*a*. *A. rufula* sp. nov., ♂ genitalia.



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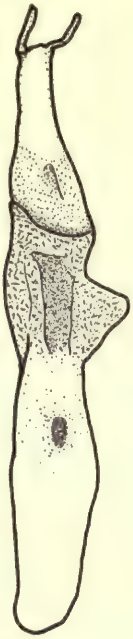
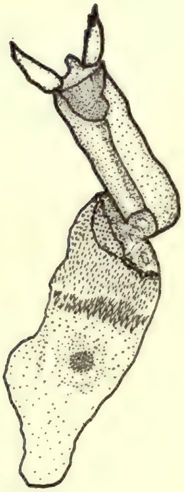


2b



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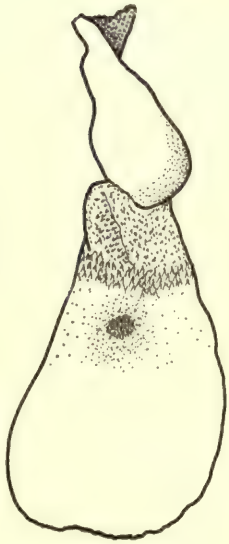
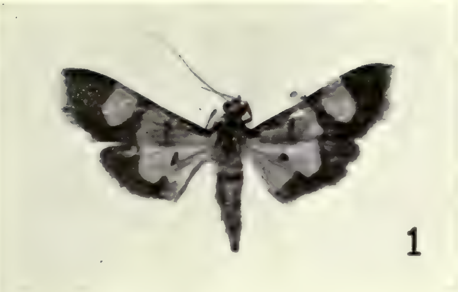


4b

FIG. 1*b*. *Aethalöessa floridalis* Zell., ♀ bursa copulatrix and duct.
FIG. 2*b*. *A. calidalis calidalis* Guen., ♂ bursa copulatrix and duct.
FIG. 3*b*. *A. calidalis tiphalis* Walk., ♀ bursa copulatrix and duct.
FIG. 4*b*. *A. rufula* sp. nov., ♀ bursa copulatrix and duct.

PLATE 4

FIG. 1. *Aethalöessa floridalis* Zell.
FIG. 2. *A. calidalis calidalis* Guen.
FIG. 3. *A. calidalis tiphalis* Walk.
FIG. 4. *A. rufula* sp. nov.



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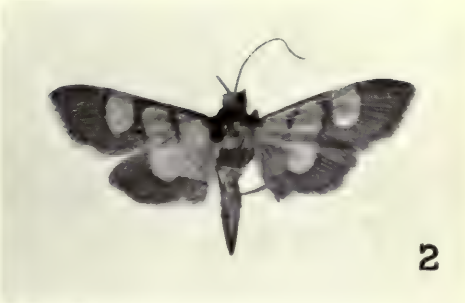

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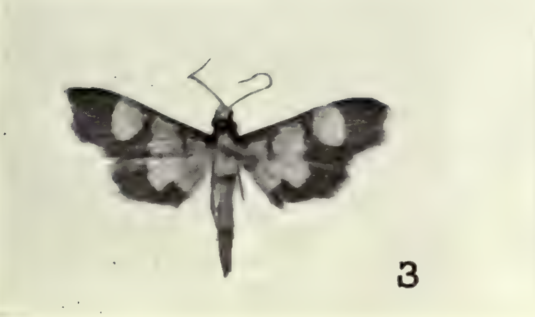

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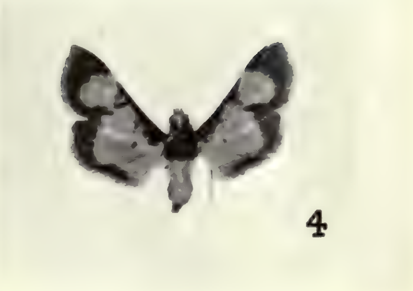

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MICROLEPIDOPTERA FROM THE SOLOMON ISLANDS

ADDITIONAL RECORDS AND DESCRIPTIONS OF MICROLEPIDOPTERA COLLECTED IN THE SOLOMON ISLANDS BY THE RENNELL ISLAND EXPEDITION 1953—54

J. D. BRADLEY

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ENTOMOLOGY Vol. 10 No. 4
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BY

J. D. BRADLEY

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NATURAL HISTORY

Pp. 111–168 ; *Plates* 5–19 ; 2 *Text-figures*

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MICROLEPIDOPTERA FROM THE SOLOMON ISLANDS

ADDITIONAL RECORDS AND DESCRIPTIONS OF MICROLEPIDOPTERA COLLECTED IN THE SOLOMON ISLANDS BY THE RENNELL ISLAND EXPEDITION 1953–54

By J. D. BRADLEY

An account (Bradley, 1955) of the expedition to Rennell and Bellona Islands appears in the series *The Natural History of Rennell Island, British Solomon Islands*, published jointly by the Copenhagen Museum and the British Museum (Natural History). A report on the Microlepidoptera collected on those islands also appears in that series (Bradley, 1957).

The Microlepidoptera studied in the present paper are mostly from other islands of the Solomons group which my wife and I visited. A few from the New Hebrides, where we called on the voyage from Australia to the Solomons, have been included, and also some material in the British Museum collections which proved to be erroneously identified and to belong to a new species described below. Microlepidoptera collected on Norfolk and Lord Howe Islands, ports of call on the voyage to the Solomons, have been studied in a previous paper (Bradley, 1956) and are referred to here only where revision has become necessary.

The main purpose of the expedition to the Solomons was to obtain a representative collection of natural history specimens from the islands of Rennell and Bellona. But circumstances provided time and opportunity for visits to some of the other islands in the group, where we collected Lepidoptera and other insects. It is the Microlepidoptera amongst this material, excluding the Pyraloidea, which are now studied.

It was nearly four weeks after arriving at Honiara, the Protectorate capital on the island of Guadalcanal, before there was a definite prospect of a boat to take us across the last two hundred miles of ocean to our objective—Rennell Island. In this interval we were fortunate in being invited by Dr. F. R. Hollins, the then S.M.O. and a keen lepidopterist, to accompany him on a visit to Ontong Java, an atoll in the extreme north of the group. This trip included visits to the islands of Tulagi and Ysabel. After our return from Rennell and Bellona to Guadalcanal nearly two months elapsed before the cargo ship on which we were to leave for Australia finally called, having been delayed by changes in its itinerary in the islands. During this period we spent ten days at Tapenanje, a small native village about five miles west of Honiara and about the same distance inland, in the foothills above the Poha River. We then returned to Kukum, two miles east of Honiara, and after Christmas spent ten days at Ilu, seventeen miles east of Honiara on the plains of the north coast of Guadalcanal. The remaining interval before our departure for Australia was spent in Honiara. Our stay in the Solomons was thus extended beyond the three to four months originally planned to nearly five months—September, 1953 to January, 1954. The prolonged stay somewhat naturally strained our very limited resources, and we would like to take this opportunity to express our appreciation once again for the assistance and advice which we received from many sources, most of which are mentioned in the Rennell account, and which helped greatly towards the success of the expedition.

A map of the South-West Pacific is figured on p. 115, and shows the geographical position of the Solomons group and the islands visited by the expedition. Data on the collecting localities are given below.

COLLECTING LOCALITIES

GUADALCANAL ISLAND

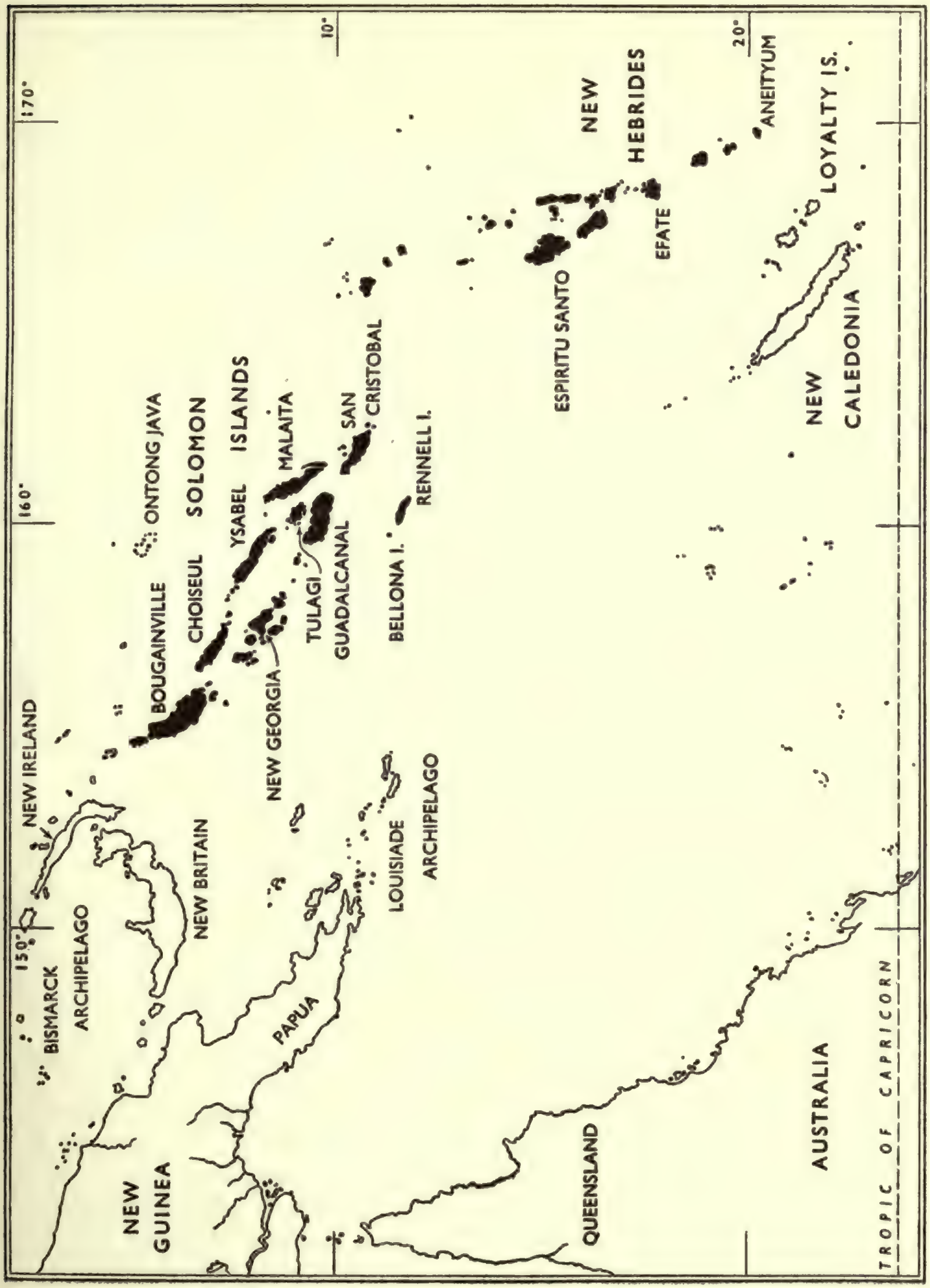
Honiara. The Protectorate capital situated on the north-eastern coast. The coastal strip here is a few hundred yards wide and is backed by terraced limestone ridges. The township is scattered and is mainly on the coastal strip with (in 1954) a few new houses on the crests of the ridges. Where it has not been cleared or kept back the dense lowland forest comes down to the belt of strand vegetation along the seashore. Much of the ridges is free of forest and is covered instead with tall kunai grass.

Dates of collecting. 5–14.i.1954.

Kukum (Honiara). Material labelled with the dates given below was collected at the Agricultural Station at Kukum, about two miles along the coast east of Honiara township. Immediately inland from the estate are low hills some of which are topped with kunai grass, and with forest and thick undergrowth in the valleys. A mercury-vapour lamp was run from a small domestic generator for several nights here, from dusk until midnight, and proved highly effective. This was the only locality at which electricity was available to operate m.v. light. At other times a paraffin pressure lantern was used, as described in the Rennell account.

Dates of collecting. 5–21.ix.1953; 3–11.x.1953; 2–9.xii.1953; 23–28.xii.1953.

Tapenanje. A small native village, five or six miles west of Honiara and about the same distance inland, sited on top of one of the foothills which in this area go up to about 1,000 ft. a.s.l. The surrounding valleys are deeply eroded and filled with dense luxuriant vegetation typical of tropical forests of this region. The village is reached after a four-hour march along a track following roughly the course of the River Poha, commencing near its mouth a few miles outside


150°
160°
170°
10°
20°
NEW GUINEA
BISMARCK ARCHIPELAGO
NEW IRELAND
NEW BRITAIN
PAPUA
LOUISIADE ARCHIPELAGO
NEW GEORGIA
BOUGAINVILLE
CHOISEUL
YSABEL
SOLOMON ISLANDS
ONTONG JAVA
MALAITA
TULAGI
GUADALCANAL
SAN CRISTOBAL
BELLONA I.
RENNELL I.
ESPIRITU SANTO
NEW HEBRIDES
EFATE
ANEITYUM
LOYALTY IS.
NEW CALEDONIA
QUEENSLAND
AUSTRALIA
TROPIC OF CAPRICORN

Map. The South-West Pacific, showing the geographical position of the Solomon Islands.

Honiara. On the upward journey at the beginning of December the river was waded perhaps a dozen times and was shallow, but on the return journey ten days later the rainy season had commenced and the river had swollen and in some places was very much deeper.

Dates of collecting. 10–23.xii.1953.

Ilu. Formerly the site of an experimental farm, now largely abandoned. Situated about seventeen miles south-east of Honiara and a mile or two inland on the low-lying alluvial plain which between here and Kukum extends for several miles inland. Much of the formerly cultivated farmland has been reclaimed by natural vegetation. The light-trap was sited on open grassland at the fringe of forest.

Dates of collecting. 28.xii.1953–5.i.1954.

ONTONG JAVA ATOLL

Avaha and Leuaniua. Ontong Java is a low coral atoll about one hundred and fifty miles due north of Ysabel in the main group. It is formed of numerous small islands, none of them more than 20 ft. above sea level, arranged in a continuous chain and enclosing a lagoon about thirty-five miles long by fifteen miles wide. The atoll is encircled by an almost unbroken fringing reef which in many places is exposed at low tide. The two islands visited—Avaha and Leuaniua—are among the largest and are about a quarter of a mile across and two and three miles long respectively. Coconut palms are plentiful and there is a little strand vegetation and low undergrowth including ferns. On Leuaniua there is an extensive swampy area thickly covered with grasses and with some trees and shrubs where taro is cultivated in shallow depressions containing a black fibrous mud, heavily infested with mosquitoes.

Dates of collecting. 29–30.ix.1953.

YSABEL ISLAND

Tatamba. A landing place near Tanabuli situated near the south-east tip of the island. One night only was spent here on the return voyage from Ontong Java. We arrived in the late afternoon and the light-trap was taken ashore and operated throughout the night on a track fringing dense forest.

Date of collecting. 2.x.1953.

TULAGI ISLAND

Tulagi. A small island forming part of the Nggela (Florida) group between twenty and thirty miles east of Guadalcanal. Once the Protectorate capital but evacuated during World War II, when it suffered considerable damage, and now mostly reclaimed by jungle. At the time of our visit only two European families were living there and a few Chinese and Solomon Islanders. It has a fine natural harbour and as the R.C.S. *Betua* developed engine trouble on the way to Ontong Java we had to call there for repairs.

Dates of collecting. 22–25.ix.1953.

MATERIAL STUDIED

The present study has been greatly handicapped by the fragmentary state of existing knowledge of the lepidopterous fauna of the Solomon Islands. The least known group is the Microlepidoptera, which have received little attention in the past. They are richly represented in species belonging to genera common to the luxuriant tropical rain forests of the South-West Pacific. But until systematic collecting is carried out, to include the mountainous regions of the larger islands where the more interesting endemic forms may be expected to occur, the full composition and affinities of the fauna must remain in many respects unknown.

The present material is representative of the low forest and littoral fauna and has consequently a higher proportion of widely distributed species. A difficulty experienced when determining this material was to ensure that species apparently not among those already recorded from the Solomons were not known elsewhere. A considerable number came into this category and a surprisingly high proportion of these were found to be known species occurring in the Indo-Australian region. Others proved to be species occurring in other island groups of the South-West Pacific, and in some instances previously known only from the type specimens.

Altogether a little over 1,000 specimens have been examined and determined to genus or species. These comprise 120 described species, 43 species apparently new to science and 1 new subspecies, and 25 species identified to genus only. Many of the latter appear to be undescribed but have for the present been placed only in a genus, since the available material is considered inadequate for descriptive purposes. One new genus only is described. This is erected for a new species belonging to the family Incurvariidae and so far as is known the first representative of this family to be recorded from the Solomon Islands. Existing genera have been used for species in other families, but in some instances generic assignments have been made with reservation and should be regarded as tentative, particularly in some of the larger " well-known " genera, since the genera need revision.

The types of the new species described below are in the British Museum (Natural History). The insects are described as seen under a low-power lens of up to ×15 magnification, and the colour terms used are principally from Ridgway's *Color Standards and Color Nomenclature.*

The illustrations of the wings, Plates 1–3, and of the genitalia, Plates 4–15, are reproduced from photographs and photomicrographs taken by Mr. J. V. Brown of the photographic section of this museum. The magnifications vary greatly in the photographs of the wings so have not been indicated ; instead the measurements of the expanded wings of each species are given.

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—— 1956. Records and Descriptions of Microlepidoptera from Lord Howe Island and Norfolk Island collected by the British Museum (Natural History) Rennell Island Expedition, 1953. *Bull. Brit. Mus.* (*nat. Hist.*), *Ent.* **4**, No. 4 : 145–164, 26 figs.

—— 1957. Microlepidoptera from Rennell and Bellona Islands. *The Natural History of Rennell Island, British Solomon Islands*, **2** (19) : 87–112, 113 figs.

ACKNOWLEDGEMENTS

The Rennell Island Expedition was supported by grants from the Percy Sladen Memorial Fund, the Godman Exploration Fund, and the British Museum (Natural History).

TORTRICIDAE

TORTRICINAE

Adoxophyes templana (Pagenstecher)

Tortrix templana Pagenstecher, 1900, *Zoologica* (Stuttgart), **12** (No. 29) : 225.
Adoxophyes ioterma Meyrick, 1910, *Proc. Linn. Soc. N.S.W.* **35** : 205. ***Syn. nov.***

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 14 ♂, 2 ♀ ; Tapenanje, 10–23.xii, 5 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 7 ♂.

DISTRIBUTION. Australia (Queensland), New Guinea, Bismarck Archipelago and Solomon Is.

The new synonymy given above follows from a comparison of the types of *A. templana* (Pagenstecher) and *A. ioterma* Meyrick, which are in the British Museum (Natural History).

Adoxophyes aurantiana sp. n.

(Pl. 5, fig. 1)

Adoxophyes templana (*Pagenstecher*) Meyrick *nec* Pagenstecher, 1910, *Proc. Linn. Soc. N.S.W.* **35** : 208 (*partim*).
Adoxophyes templana (*Pagenstecher*) Bradley *nec* Pagenstecher, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 89.

♂ 12–16 mm. ♀ 17–20 mm. Labial palpus, head, thorax and tegula apricot-yellow suffused with orange. Antenna apricot-yellow, annulations greyish-orange. Fore wing apricot-yellow overlaid with a fine reticulate pattern of orange which in some examples is superimposed on the other markings ; markings variable, in well-marked examples as follows : a narrow, metallic, violet-grey medial fascia, sprinkled with black, oblique from costa at about 1/3 to inner margin at 2/3 ; a similar, irregular, subterminal fascia, broad at costa and again at tornus where it is confluent with the medial fascia, constricted or interrupted at the middle, in some examples weak or obsolescent in the tornal area, broken or interrupted along the anterior edge of the costa and replaced by apricot-yellow ground colour ; a small, metallic violet-grey patch, sprinkled with black, at base of costal fold in the male and costa in the female, a similar marking at base of inner margin and another slightly larger at about 1/3 ; in examples with abnormally strong and conspicuous markings a narrow concolorous band sometimes links the middle of the medial fascia to the costal part of the subterminal fascia ; in poorly marked examples the markings may be reduced to numerous small metallic patches or spangles, or so greatly reduced as to be indefinable ; cilia apricot-yellow along termen, purplish-grey at tornus. Hind wing whitish-ochreous to pale ochreous ; cilia straw yellow. Abdomen whitish-ochreous, suffused with grey above ; a small straw-yellow anal tuft in male. Legs whitish-ochreous, fore and middle legs suffused with orange exteriorly.

Male genitalia (Pl. 4, fig. 1) : There appears to be little comparative difference between this species and *A. templana* (Pagenstecher), but the sheaf of cornuti in the aedeagus is smaller and consists of 5–8 cornuti as compared with 12–15 slightly longer cornuti in *templana*.

Female genitalia (Pl. 8, figs. 2, 3) : There appear to be no useful differences between this species and *templana* by which to separate them.

GUADALCANAL : Honiara, 8–18.ix, 5 ♂, including holotype, 4–10.x, 4 ♂ ; Tapenanje, 10–23.xii, 2 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

RENNELL I.: Hutuna, 18.x–24.xi, 24 ♂, 1 ♀ ; Tingoa, 9–11.xi, 1 ♂ ; Onegaghugha, 28.x, 1 ♂ ; 26.xi, 1 ♂.

BELLONA I.: Matahenua, 29.xi, 1 ♀.

The following additional paratypes are specimens which have been removed from the series of *A. templana* (Pagenstecher) in the museum collections :

GUADALCANAL : 1905, A. S. Meek, 4 ♀.

TULAGI : 25.viii.1933, H. T. Pagden, 1 ♂.

NEW GEORGIA : 1905, A. S. Meek, 1 ♀.

NEW BRITAIN : Witu I., iii.1925, A. F. E., 1 ♀ ; Witu I., vi.1925, A. F. E., 8 ♀ ; Witu I., vii.1925, A. F. E., 1 ♀ ; Kinigunong, 1906, C. S., 1 ♀.

NEW GUINEA : Woodlark I., 1905, A. S. Meek, 1 ♀.

This species is closely related to *A. templana* (Pagenstecher), and the two have previously been confused. Superficially they are very similar and the variability of the fore wing markings sometimes makes separation difficult, but usually *aurantiana* may be distinguished by its brighter, orange coloration. The genitalia in both sexes are also very similar ; in the male differences are evident in the cornuti of the aedeagus as described above.

Adoxophyes moderatana (Walker)

Tortrix moderatana Walker, 1863, *List. Lep. Ins. B.M.* **28** : 329.

Adoxophyes epizeucta Meyrick, 1910, *Proc. Linn. Soc. N.S.W.* **35** : 207.

Parascaptia insignifica Rothschild, 1915, *Lep. B.O.U. Wollaston Exped. N. Guinea*, p. 46. ***Syn. nov.***

Adoxophyes prosiliens Meyrick, 1928, *Exot. Microlep.* **3** : 454. ***Syn. nov.***

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 4 ♂, 2 ♀ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. India, Assam, Borneo, New Guinea, and the Andaman and Solomon Is.

The above synonymy has been established following an examination of the types of the species concerned, all of which are in the British Museum (Natural History).

Adoxophyes tripselia (Lower)

Capua ? tripselia Lower, 1908, *Trans. roy. Soc. S. Aust.* **32** : 318.

GUADALCANAL : Tapenanje, 10–23.xii, 2 ♂.
DISTRIBUTION. Australia (Queensland), New Guinea, Sudest I. and Rossel I.

Adoxophyes fasciculana (Walker)

Tortrix fasciculana Walker, 1866, *List. Lep. Ins. B.M.* **35** : 1785.
Adoxophyes cyrtosema Meyrick, 1886, *Trans. ent. Soc. Lond.* **1886** : 276.
Capua epipepla Lower, 1908, *Trans. roy. Soc. S. Aust.* **32** : 318.

GUADALCANAL : Honiara, 4–10.x, 8–18.xi, 6–12.i, 6 ♂, 1 ♀; Tapenanje, 10–23.xii, 1 ♂.
DISTRIBUTION. Australia (Queensland), New Guinea, Solomon Is., Fiji, New Hebrides, Formosa, Ceram, Philippines and the Moluccas.

Homona coffearia (Nietner)

Tortrix coffearia Nietner, 1861, *Obs. Enemies Coffee Trees in Ceylon*, p. 24.

GUADALCANAL : Honiara, 4–10.x, 2 ♂.
DISTRIBUTION. A widespread species in the Indo-Australian region, often a pest on coffee and tea.

SCHOENOTENINAE

Diactenis veligera Meyrick

Diactenis veligera Meyrick, 1928, *Exot. Microlep.* **3** : 458.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂.
DISTRIBUTION. Australia (Queensland) and Andamans.

OLETHREUTINAE

Hermenias pachnitis Meyrick

Hermenias pachnitis Meyrick, 1912, *J. Bombay nat. Hist. Soc.* **21** : 852.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂.
DISTRIBUTION. Australia (Queensland) and Ceylon.

Spilonota indentata Bradley

Spilonota indentata Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 89.

GUADALCANAL : Honiara, 8–18.ix, 3 ex.; Tapenanje, 10–23.xii, 1 ♂.
YSABEL : Tatamba, 2.x, 1 ♂.
DISTRIBUTION. Solomon Is.

Icelita tatarana Bradley

Icelita tatarana Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 91.

ONTONG JAVA : Leuaniua, 29.ix, 2 ♂.
DISTRIBUTION. Solomon Is.

Spilonota cryptogramma Meyrick

Spilonota cryptogramma Meyrick, 1922, *Exot. Microlep.* **2** : 520.

TULAGI : 24.ix, 1 ♀.
DISTRIBUTION. Fiji.

Acroclita physalodes (Meyrick)

Rhopobota physalodes Meyrick, 1910, *Trans. ent. Soc. Lond.* **1910** : 368.

ONTONG JAVA : Leuaniua, 29.ix, 2 ♀ ; Avaha, 30.ix, 2 ♀.
DISTRIBUTION. Ceylon, Chagos Is., Fiji, Solomon Is., Austral Is. and Seychelles.

Acroclita spiladorma Meyrick

Acroclita spiladorma Meyrick, 1932, *Exot. Microlep.* **4** : 221.

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 6–12.i, 3 ♂ ; Tapenanje, 10–23.xii, 1 ♂.
DISTRIBUTION. Java.

Ancylis enneametra Meyrick

Ancylis enneametra Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 72.

GUADALCANAL : Honiara, 8–18.ix, 6–12.i, 3 ♂, 5 ♀ ; Tapenanje, 10–23.xii, 2 ♀.
DISTRIBUTION. Samoa.

Crocidosema plebejana Zeller

Crocidosema plebejana Zeller, 1847, *Isis von Oken*, **40** : 721.

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 11 ex.; Ilu Farm, 26.xii.53–4.i.54, 7 ex.

DISTRIBUTION. Occurring throughout the Pacific islands and widespread in both hemispheres up to the temperate regions. The larva feeds on the seeds of various species of Malvaceae.

Eucosma isomella Meyrick

Eucosma isomella Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 73.

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 6–12.i, 2 ♂, 1 ♀.
DISTRIBUTION. Samoa.

Bactra blepharopis Meyrick

Bactra blepharopis Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 255.

GUADALCANAL : Tapenanje, 10–23.xii, 2 ♂; Ilu Farm, 26.xii.53–4.i.54, 1 ♂; Honiara, 6–12.i, 1 ♂.
DISTRIBUTION. Australia (Queensland), New Hebrides and Fiji.

Bactra truculenta Meyrick

Bactra truculenta Meyrick, 1901, *J. Bombay nat. Hist. Soc.* **19** : 586.
Bactra scythropa Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 254.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀.
DISTRIBUTION. India, Java and Timor.

Bactra minima Meyrick

Bactra minima Meyrick, 1909, *J. Bombay nat. Hist. Soc.* **19** : 586.

GUADALCANAL : Ilu Farm, 26.xii.53–4.i.54, 2 ♂.
DISTRIBUTION. Ceylon.

Lobesia aeolopa Meyrick

Lobesia aeolopa Meyrick, 1907, *J. Bombay nat. Hist. Soc.* **17** : 976.
Lobesia proterandra Meyrick, 1921, *Zool. Meded. Mus. Leiden*, **6** : 155.
Lobesia dryopelta Meyrick, 1932, *Exot. Microlep.* **4** : 225.
Lobesia eustales Bradley, 1956, *Bull. Brit. Mus. (nat. Hist.), Ent.* **4**, No. 4 : 146. ***Syn. nov.***

GUADALCANAL : Honiara, 8–18.ix, 1 ♂; Tapenanje, 10–23.xii, 1 ♀.
DISTRIBUTION. India, Ceylon, Java, Formosa, Burma, Solomon Is., Lord Howe I., Africa (Uganda, Nyasaland and Cape Colony), Sao Thomé I. and Madagascar.

Lobesia physophora (Lower)

Lomaschiza physophora Lower, 1901, *Trans. roy. Soc. S. Aust.* **25** : 69.

GUADALCANAL : Honiara, 8–18.ix, 3 ♂.
DISTRIBUTION. Australia (Queensland).

Lobesia sp.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂.

This appears to be an undescribed species related to *L. rhipidoma* Meyrick from Fiji, but more material is needed for study before it can be properly placed or described.

Lobesia sp.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂.

A distinctive species in coloration and markings, and almost certainly undescribed. The abdomen and head of the above specimen are missing.

Lobesia sp.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♀.

This specimen is superficially reminiscent of the European species *L. botrana* Schiffermüller, and perhaps belongs to an allied tropical species. In the absence of a male a more definite determination has not been possible.

Steriophotis peltophora Meyrick

Steriophotis peltophora Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36**: 259.

TULAGI: 24.ix, 1 ♀.

DISTRIBUTION. Australia (Queensland).

Crusimetra anastrepta Meyrick

Crusimetra anastrepta Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. **2**: 71.

GUADALCANAL: Honiara, 8–18.ix, 1 ♀; Tapenanje, 10–23.xii, 3 ♂; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. Ceylon and Samoa.

Cryptophlebia ombrodelta (Lower)

Arotrophora (?) *ombrodelta* Lower, 1898, *Proc. Linn. Soc. N.S.W.* **23**: 48.
Cryptophlebia carpophaga Walsingham, 1899, *Indian Mus. Notes*, **4**: 106.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂.

DISTRIBUTION. South India, Ceylon, Formosa, Java, Siam, Philippine Is., Guam, Dampier I., Australia (Queensland, N. Territory and N.S. Wales).

The larva is polyphagous and feeds on the leaves, pods, seeds and fruits of various tropical trees and shrubs.

Cryptophlebia phaeacma (Meyrick)

Argyroploce phaeacma Meyrick, 1931, *Exot. Microlep.* **4** : 129.

GUADALCANAL : Honiara, 5–9.ix, 2 ♀.
DISTRIBUTION. New Britain.

Cryptophlebia encarpa (Meyrick)

Argyroploce encarpa Meyrick, 1920, *Exot. Microlep.* **2** : 349.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂; Honiara, 6–12.i, 1 ♀.
DISTRIBUTION. South India, New Hanover I. and Sudest I.

Olethreutes mormopa (Meyrick)

Platypeplus mormopa Meyrick, 1906, *J. Bombay nat. Hist. Soc.* **17** : 136.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂.
DISTRIBUTION. India, Ceylon, Borneo and Tonkin.

Olethreutes pachypleura (Meyrick)

Argyroploce pachypleura Meyrick, 1921, *Exot. Microlep.* **2** : 448.

GUADALCANAL : Honiara, 4–10.x, 1 ♂.
DISTRIBUTION. Fiji.

Olethreutes ancosema solomonensis (Bradley), ***n. comb.***

Argyroploce ancosema solomonensis Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 94.

GUADALCANAL : Honiara, 4–10.x, 2 ♂.
DISTRIBUTION. Solomon Is. (Rennell I.). The nominate race was described from Fiji, and a similar form occurs in the New Hebrides.

Olethreutes semiculta (Meyrick)

Argyroploce semiculta Meyrick, 1909, *J. Bombay nat. Hist. Soc.* **19** : 604.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀.
DISTRIBUTION. India, Ceylon, Assam and Tonkin.

Olethreutes operosa (Meyrick)

Argyroploce operosa Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 272.

YSABEL : Tatamba, 2.x, 1 ♂.
DISTRIBUTION. New Guinea and Malaya.

Olethreutes anaprobola (Bradley), ***n. comb.***

Argyroploce anaprobola Bradley, 1953, *Proc. Hawaii. ent. Soc.* **15** : 109.

GUADALCANAL : Honiara, 4–10.x, 1 ♂.
DISTRIBUTION. Fiji.

Olethreutes albitibiana (Snellen), ***n. comb.***

Grapholitha (*Sisona*) *albitibiana* Snellen, 1901, *Tijdschr. Ent.* **44** : 69.
Argyroploce inodes Meyrick, 1911, *Proc. Linn. Soc. N.S.W.* **36** : 269.

GUADALCANAL : Honiara, 8–18.ix, 3 ex.; Tapenanje, 10–23.xii, 1 ex.
DISTRIBUTION. China, Ceylon, Andamans, Java, New Guinea, New Britain and New Ireland.

Olethreutes empherana sp. n.

(Pl. 5, fig. 2)

♂♀ 17–18 mm. Labial palpus cartridge buff mottled with irregular patches of deep purplish vinaceous mixed with taupe brown. Head cartridge buff suffused with vinaceous, lower part of face deep purplish vinaceous. Antenna cream-buff anteriorly, fuscous behind. Thorax, tegula and antennal scape cartridge buff overlaid with a mixture of saccardo's olive and fuscous, thorax with a raised posterior tuft. Fore wing ground colour cartridge buff, irrorate with deep purplish vinaceous and black scales ; markings saccardo's olive, an ill-defined basal patch reaching to 1/3, strongest at costa ; a dense patch of raised greyish (quaker drab) scales on inner margin at base ; an irregular medial fascia of saccardo's olive reaching from costa to 2/3 across wing, lightly sprinkled with black scales and partly traversed by a heavy black dash a little before middle of wing ; a narrow saccardo's olive subterminal fascia marked with black interneural dashes and constricted at middle ; a small, roughly triangular, olive mixed with black marking at middle of termen, the apex of which is connected by a similarly coloured thin line to the subterminal fascia at a point below the costa ; costa marked with small black strigulae and with four evenly spaced pairs of white strigulae from a little beyond middle to near apex ; arising from these strigulae and running parallel with costa are violet-grey lines which merge to form a single line curving slightly away from costa towards apex and terminating below the strigulae most apicad ; thin black transverse dashes at the ends of the radial veins along the termen ; cilia honey-yellow in male, cartridge buff in female, in both sexes mixed with fuscous and deep purplish vinaceous along termen, and terminating in a fuscous streak beyond tornus. Hind wing greyish fuscous ; cilia greyish, tinged with vinaceous around apex. Male with posterior tibia and first tarsal segment clothed with a comb-like brush of long whitish scales and with a long cartridge buff hair-pencil from the base of the tibia dorsally.

Male genitalia (Pl. 4, fig. 7) : Valva gently tapered and not constricted before cucullus as in *O. cellifera* (Meyrick).

Female genitalia (Pl. 8, figs. 4–6): Ostium narrow medially, caudal margin rounded, lateral margins straight and converging to form an acute angle proximally; the ostium in *cellifera* is similar in size but of different proportions, being slightly more broad than it is long.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂, holotype, 1 ♀, allotype.

Near to *O. cellifera* (Meyrick) which occurs in Ceylon, India and Malaya, but larger and having the fore wing more richly coloured and the hind wing much darker.

Statherotis bicolorana sp. n.

(Pl. 5, fig. 3)

♀ 18 mm. Labial palpus dark fuscous, tips of individual scales whitish producing an irrorate effect, apex of terminal segment whitish. Head, thorax and tegula wholly fuscous. Antenna and scape fuscous. Fore wing cream-buff, markings well-defined, dark mummy brown, thinly edged with black; a basal patch occupying 1/4 of wing and with outer edge straight and slightly outwardly-oblique from costa; a moderately broad medial fascia, somewhat oblique, inner edge somewhat sinuate, outer edge sinuate and with a pronounced outward bulge at middle; terminal area light mummy brown confluent with lower (dorsal) half of medial fascia; a moderately large, circular, dark mummy brown marking in upper half, and a similar much smaller spot at apex; small mummy brown markings at the ends of radial veins along termen, decreasing in size towards tornus and edged with cream-buff; cilia grey, darker above apex, some tipped with cream-buff along termen, wholly cream-buff at tornus. Hind wing drab, base and costal margin to near apex cartridge buff; cilia light grey.

Female genitalia: Pl. 9, figs. 1–3.

GUADALCANAL: Honiara, 8–18.ix, 1 ♀, holotype.

This is the only representative of the small genus *Statherotis* Meyrick known from the Solomons. It is nearest to *S. catharota* Meyrick, which occurs in the Andaman Islands.

Laspeyresia mediana (Walker)

Tospitis mediana Walker, 1866, *List. Lep. Ins. B.M.* **35**: 1798.
Bursadella sulfurella Pagenstecher, 1900, *Zoologica* (Stuttgart), **12** (No. 29): 231.

GUADALCANAL: Honiara, 4–10.x, 1 ♀.

DISTRIBUTION. New Guinea, Louisiade Archipelago and Solomon Is.

The two species *L. turifera* Meyrick, from Assam, and *L. gratulata* Meyrick, from the Philippines, show close affinities to *L. mediana* (Walker). Following a comparison of the type material of these species, in the British Museum (Natural History), I am of the opinion that *turifera* Meyrick and *gratulata* Meyrick are no more than subspecies of *mediana* (Walker), and accordingly relegate them to this category:

Laspeyresia mediana turifera Meyrick, ***status nov.***
Laspeyresia mediana gratulata Meyrick, ***status nov.***

Laspeyresia plumbosana sp. n.

(Pl. 5, fig. 4)

♂♀ 7–9 mm. Labial palpus white, terminal segment suffused with fuscous. Head, thorax, tegula, antenna and scape drab varying to hair brown; vertex (between antennae) cream-buff, lower part of face white. Fore wing ground colour fuscous; costa with seven or eight oblique sordid white strigulae, those at 2/5, 3/5 and 4/5 emitting three very oblique leaden deep plumbago grey lines curving backwards before reaching middle of wing thence continuing to dorsum as weak parallel sinuous lines with margins outlined in drab, the whole producing an ill-defined striate dorsal blotch; costal strigula at 4/5 and strigula at apex connected by a short sinuous leaden plumbeous line enclosing one other strigula shorter and nearest apex; ocellus only indicated by a similar striation, followed just before edge of termen in middle by two or three black dots, the uppermost larger; cilia dark grey, a fuscous sub-basal line notched below apex and with a small whitish dot in the indentation. Hind wing light fuscous; cilia grey, a darker sub-basal line. Abdomen fuscous above, whitish beneath. Legs whitish suffused with grey.

Male genitalia: Pl. 9, fig. 4.

GUADALCANAL: Ilu Farm, 26.xii.53–4.i.54, 8 ♂, including holotype, 1 ♀, allotype, abdomen missing.

Near to the Javan species *L. exocentra* Meyrick, the coloration and markings of the fore wings are almost identical but *exocentra* is readily distinguished by the strong yellow coloration on the vertex of the head.

Laspeyresia xylocrossa Meyrick ?

Laspeyresia xylocrossa Meyrick, 1939, *Trans. R. ent. Soc. Lond.* **89**: 52.

GUADALCANAL: Honiara 8–18.ix, 4 ♂.

The four male specimens from the Solomons are in a rather poor condition but compare fairly well superficially with the female lectotype of *L. xylocrossa* from Java. As the museum collection contains only female examples of *xylocrossa* from Java it has not been possible to verify the present identification by examination of the genitalia. The males from the Solomon Islands have a well-developed coremata on the eighth abdominal segment.

Grapholita pagenstecheri sp. n.

(Pl. 5, fig. 5)

♂ 10 mm. Labial palpus cartridge buff, second segment roughened beneath. Front of head (rubbed) cartridge buff; crown of head, thorax and tegula greyish fuscous, base of tegula overlaid with cartridge buff. Antenna (broken) fuscous-black. Fore wing dark fuscous; a patch of four parallel, indistinct, sordid white lines from about middle of dorsum curving obliquely outwards and reaching about half-way across wing; nine well-defined, short, oblique cream-buff strigulae from costa between 1/4 and apex, the four nearest the apex being whitish at edge of costa, interstices between these strigulae fuscous-black; a weak trace of bluish leaden-metallic streaks emitting from costal strigulae but none clearly definable; a small blackish spot at apex; cilia fuscous, a fuscous-black basal line interrupted below costa by a whitish dot. Hind wing fuscous, paler basally; cilia light grey, a broad fuscous medial line and a thin dark fuscous basal line.

Male genitalia: Pl. 9, figs. 5, 6.

GUADALCANAL: Honiara, 4–10.x, 1 ♂, holotype.

Related to *Grapholita isacma* (Meyrick) ***n. comb. sp. revocata***, which occurs in Assam: the two species are superficially alike and are best separated on genitalia; in *isacma* the apical part of the aedeagus is slender and tapers to an acute point and is curved almost at right angles to the main part. The latter species is removed from synonymy under *Grapholita delineana* Walker, described from China, following an examination of the types. The three species *apicatana* Walker, *quadristriana* (Walsingham) and *tristriatana* Pagenstecher are retained as synonyms of *delineana*. The types of the first two have been examined and found to be correctly associated with *delineana*. The type of *tristriatana* has not been seen, and Dr. H. J. Hannemann, of the Zoological Museum, Humboldt University, Berlin, where the type is reputed to be, informs me that it cannot be traced. As *tristriatana* was described from the Bismarck Islands there is a possibility that it is not conspecific with *delineana* and that it might prove to be the species described above.

GELECHIIDAE

Sitotroga psacasta (Meyrick)

Paltodora psacasta Meyrick, 1908, *Proc. zool. Soc. Lond.* **1908**: 723.
Sitotroga celyphodes Meyrick, 1909, *Ann. Transvaal Mus.* **2**: 10, pl. 4, fig. 3.
Sitotroga nea Walsingham, 1920, *Ent. mon. Mag.* **56**: 9.

GUADALCANAL: Honiara, 4–10.x, 5 ♀, 6–12.i, 13 ♂, 3 ♀.

This species has not previously been recorded from the Indo-Australian region and its occurrence in the Solomons was unexpected. From its known distribution, given below, it would appear to be a comparatively recent introduction to this area.

The identity of the material from the Solomon Islands was at first not recognized and photomicrographs of the genitalia were taken preparatory to describing the species as new. As the genitalia of *psacasta* appear to be unknown in the literature these photomicrographs are now illustrated. The moth is illustrated in Pl. 2, fig. 1.

Male genitalia (Pl. 8, figs. 2, 3): Valvae asymmetrical; sacculus free distally, tapered to an irregular, slender point; a small, membranous lobe projects from the ventral margin of the valva where the sacculus separates, and bears on its inner surface a dense patch of bristle-like setae. Uncus broad, hooded, lateral margins setose. Gnathus in the form of a strongly sclerotized, curved hook.

Female genitalia (Pl. 8, figs. 4–6): Ovipositor lobes long, moderately broad, coarsely setose. Ostium opening situated near middle of ostial plate, limen slightly asymmetrical. Ductus bursae broad, widening into bursa copulatrix which is subspherical and bears two sclerotized plate-like signa.

DISTRIBUTION. South Africa (Transvaal and Natal), southern France and Sicily. Meyrick (1929, *Exot. Microlep.* **3** : 483) says of this species " Apparently spreading round the Mediterranean from S. Africa, its country of origin, probably introduced with some kind of grain ".

Pityocona probleta sp. n.

(Pl. 5, fig. 6)

♂♀ 10–11 mm. Labial palpus light buff, second segment weakly irrorate with fuscous except at apex, slightly roughened and with projecting scales beneath at apex, terminal segment rough-scaled above, with an irrorate fuscous-black medial band and a fuscous-black apical band. Head, thorax and tegula light buff ; crown of head, thorax and tegula shaded with light drab or drab grey. Antenna and scape greyish light buff ; flagellum with blackish annuli. Fore wing elongate, very narrow, long pointed, acute ; light buff overlaid with a mixture of drab and drab grey, sparsely sprinkled with blackish, blackish specks beneath fold at 1/5 of wing and beneath costa at 1/3 ; stigmata black, sometimes weakly ringed with greyish, plical usually elongate, obliquely before first discal, second discal sometimes elongate, conspicuous ; cilia light buff. Hind wing elongate, narrow, apex produced to a long finger-like point, termen sinuate ; wing and cilia smoke grey. Legs light buff with fuscous irroration.

Male genitalia (Pl. 5, figs. 7, 8) : The narrow, almost tubular valva, elbowed at the middle, is very distinctive.

Female genitalia : Pl. 10, fig. 1.

GUADALCANAL : Honiara, 6–12.i, 3 ♂, including holotype, 8–18.ix, 1 ♀, allotype, 4–10.x, 1 ♂.

The genus *Pityocona* Meyrick contains two other species : *xeropis* Meyr. from India and Ceylon, and *porphyroscia* Meyr. from Samoa. All three species are similar in size and have the characteristic long, narrow, pointed wings, and have similar wing pattern. *Probleta* is superficially nearest *xeropis*, neither of these species having the costa dark and with prismatic reflections as in *porphyroscia* ; but *probleta* is distinctly more greyish in appearance than *xeropis*, the latter being brownish.

Limenarchis pullata sp. n.

(Pl. 5, fig. 7)

♂ 16–17 mm. Labial palpus dark purplish-fuscous, first and second segments overlaid with cream-buff interiorly. Head, thorax, patagia, antenna and scape dark purplish-fuscous ; lower part of front of head and area adjacent to compound eye immediately behind antenna suffused with cream-buff. Fore wing dark purplish-fuscous, radial veins slightly emphasized by darker shading ; cilia concolorous. Hind wing dark fuscous, a lanceolate patch of specialized cream-buff scales along costa reaching to about 3/4 ; cilia concolorous ; cubital pecten short, confined to basal area, fuscous. Legs cream-buff suffused and marked exteriorly with dark fuscous.

Male genitalia : Pl. 10, fig. 2.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂, holotype.

Resembling in general appearance *L. zonodelta* Meyrick the only other species known in the genus, but readily distinguished by the yellow cilia along the termen of the fore and hind wings of *zonodelta.*

Ephysteris chersaea Meyrick

Ephysteris chersaea Meyrick, 1908, *Proc. zool. Soc. Lond.* **1908** : 725.

GUADALCANAL : Honiara, 8–18.ix, 2 ex., 5–11.i, 18 ex., 6–12.i, 6 ex.

DISTRIBUTION. South Africa, Egypt, India, Ceylon, New Guinea and Australia (Queensland). The larva is known to feed in stems of cultivated cereals, grasses, etc. and in dry vegetable refuse.

Stegasta variana Meyrick

Stegasta variana Meyrick, 1904, *Proc. Linn. Soc. N.S.W.* **29** : 314.

GUADALCANAL : Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. A widely distributed species occurring in the Ethiopian and Indo-Australian regions. The larva is attached to species of *Cassia.*

Scrobipalpa heliopa (Lower)

Gelechia heliopa Lower, 1900, *Proc. Linn. Soc. N.S.W.* **25** : 417.

GUADALCANAL : Tapenanje, 10–23.xii, 2 ♂, 5 ♀ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♀.

DISTRIBUTION. Attached to the tobacco plant, the larva boring the stems, this species occurs widely in the Ethiopian and Indo-Australian regions.

Thyrsostoma longipalpis sp. n.

(Pl. 5, fig. 8)

♂ 12 mm. Labial palpus white, terminal segment suffused with cream colour and with dark fuscous at apex interiorly, second segment with a long expansible cream colour or cream-buff hair-pencil projecting from furrow on underside at base, terminal segment nearly half as long again as second and slightly appressed. Head silvery-white, thorax and tegula white ; thorax tinged with cream colour. Antenna with scape stout and very long, also a somewhat thickened superscape, both structures clothed in whitish scales, the upper posterior margin of superscape marked with fuscous ; flagellum whitish anteriorly, fuscous posteriorly. Fore wing white shaded with tilleul-buff, markings vinaceous-buff, obscure ; rather inwardly-oblique broad fasciae near base, in middle, and towards apex; apex suffused with dark fuscous; cilia drab. Hind wing whitish suffused with fuscous; cilia drab, cream-buff along inner margin towards base.

Male genitalia (Pl. 10, figs. 3, 4): Uncus hood-shaped, bifid caudally, lobes rounded; gnathus hook very stout and well developed. Valva narrow, constricted a little before apex, rounded at apex; sacculus slender, a little over half as long as costal part of valva, slightly distended apically. Anellus lobe a little longer than sacculus, bearing a solitary seta at apex of about the same length.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂, holotype.

Superficially very similar to the Samoan species *T. nephelochtha* Meyrick, but may be distinguished by the longer terminal segment of the labial palpus which in *nephelochtha* is only about as long as the second and does not have the inner side of the apex dark fuscous.

Thiotricha angelica sp. n.

(Pl. 5, fig. 9)

♂♀ 10–11 mm. Labial palpus, head, thorax and tegula shining white. Antenna light fuscous, scape white. Fore wing shining white; anterior edge of costa fuscous near base (scarcely visible viewed directly from above); an inwardly-oblique fuscous-black streak from apex, heavy and tear-shaped in male, linear and reaching as a slightly sinuous line to dorsum a little beyond tornus in female; in both sexes this streak is preceded by a small somewhat triangular patch of apricot suffusion extending beyond the streak to the tornus; cilia white, an upturned projection of long cilia at apex, these and cilia at and below apex marked with fuscous-black at tips. Hind wing and cilia white, cilia around apex marked with a short black apical bar.

Male genitalia: Pl. 10, figs. 5, 6.

Female genitalia: Pl. 10, figs. 7–9.

GUADALCANAL: Honiara, 4–10.x, 1 ♂, holotype, 8–18.ix, 2 ♀, including allotype.

Near the Samoan species *T. anarpastis* Meyrick, but may be distinguished superficially by the absence of markings on the basal half of the fore wing.

Thiotricha tethela sp. n.

(Pl. 5, fig. 10)

♂♀ 9–10 mm. Labial palpus white, terminal segment with a weak light fuscous suffusion exteriorly. Head, thorax and tegula shining white. Antenna dark fuscous, overlaid with white at base; scape white. Fore wing white, in some examples with a weak very light fuscous suffusion (perhaps due to discoloration); markings dark mouse grey and hair brown; anterior edge of costal margin fuscous at base, a dark mouse grey very outwardly-oblique wedge-like marking from costa at about 4/5, followed by and sometimes confluent with a small triangular spot and a small inwardly-oblique dash mixed with black and very near apex; a broad hair brown or mouse grey suffusion along inner margin (dorsum) from near base to about 3/5, followed by a slender wishbone-shaped marking, the upper-most fork of this being nearly straight and reaching to a little beyond the inner end of first costal marking, the lower fork curved and terminating at the blackish pre-apical dash from costa ; cilia white, suffused with fuscous around apex, and with light fuscous along termen. Hind wing white, with a fuscous suffusion in margins, a few dark fuscous scales at apex ; cilia white, suffused with light fuscous except those at apex of wing which are marked with a short black subapical bar.

Male genitalia : Pl. 10, figs. 10–12.

Female genitalia : Pl. 10, figs. 13–15.

GUADALCANAL : Honiara, 6–12.i, 4 ♀, including holotype, 5–11.i, 1 ♂, allotype.

TULAGI : 24.ix.53, 1 ♂.

Near the Samoan species *T. symphoracma* Meyrick : in the latter species the inner margin (dorsum) of the fore wing lacks the dark suffusion, and only a single dark fuscous line arises from near the inner margin beyond middle.

Thiotricha eremita sp. n.

(Pl. 5, fig. 11)

♀ 13 mm. Labial palpus white, terminal segment suffused with fuscous. Head, thorax and tegula shining white. Antenna with basal third white, apical two-thirds fuscous-black ; scape white. Fore wing white, with a dull silvery sheen ; markings varying shades of mouse grey ; anterior edge of costal margin mouse grey suffused with fuscous near base ; a wedge-shaped outwardly-oblique dash from costa at 4/5, dark on costa becoming lighter and diffuse towards middle, followed by two short inwardly-oblique dashes on costa near apex, the second (nearest apex) of these continuing as a weak but moderately thick line to termen a little below apex ; a thick wishbone-shaped marking from a little above inner margin at about 3/5, the upper fork curved and reaching almost to middle of first costal marking, lower fork curved and reaching almost to the inner end of the costal marking ; cilia white, suffused with fuscous at and immediately below apex and with greyish along termen and tornus. Hind wing whitish, suffused with fuscous at apex ; cilia whitish, suffused with fuscous around apex, a short fuscous-black basal line at apex.

Female genitalia : Pl. 11, figs. 1–3.

GUADALCANAL : Honiara, 6–12.i, 1 ♀, holotype.

Superficially similar to *T. tethela* Bradley, but appreciably larger in size.

Thiotricha oxyopis Meyrick

Thiotricha oxyopis Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 80.

YSABEL : Tatamba, 2.x, 2 ex.

GUADALCANAL : Honiara, 6–12.i, 1 ex.

DISTRIBUTION. Samoa.

Thiotricha melanacma sp. n.

(Pl. 5, fig. 12)

♂ 8 mm. Labial palpus shining light neutral grey, terminal segment infuscate exteriorly. Head and tegula shining pale gull grey, thorax light neutral grey. Antenna fuscous. Fore wing shining pale neutral grey becoming gradually darker distally, distal third of wing overlaid with fuscous-black ; two small white pre-apical dots on costa ; a whitish tornal dash extending obliquely towards apex and preceded by a similar, parallel, shorter dash from inner margin (dorsum) at 2/3 ; cilia fuscous. Hind wing mouse grey, a small black dot at apex ; cilia concolorous, those at apex tipped with black.

Male genitalia : Pl. 11, figs. 4–6.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, holotype.

The dark coloration of this species is unusual for the genus and is distinctive. Perhaps most nearly related to the Samoan species *T. strophiacma* Meyrick.

Idiophantis pandata sp. n.

(Pl. 5, fig. 13)

♂ 10 mm. Labial palpus white, terminal segment with a broad black subapical band, apex suffused with mustard yellow. Crown of head, thorax, patagia, antenna and scape mustard yellow ; front of head white ; coloration of antenna and scape paler. Fore wing mustard yellow ; a large, quadrate, plumbago grey marking, with an admixture of mustard yellow, occupying distal half of wing except marginal strips along costa and termen ; inner edge of this marking bordered by a dull violet-black line ; a plumbago grey strigula from middle of costa extending very obliquely outwards and merging with outer corner of quadrate blotch, finely edged with dull violet-black scales along inner margin immediately below costa ; a plumbago grey subterminal line oblique from costa at about 4/5 to beyond outer corner of quadrate blotch, thence directly transverse and expanding to occupy tornal area, lightened with an admixture of whitish near costa, margins edged aniline black ; a thin white line from apex to end of indentation in termen ; cilia plumbago grey mixed with violet-black. Hind wing light grey ; cilia concolorous, a short aniline black basal bar at apex of wing. Legs light grey.

Male genitalia : Pl. 11, figs. 7–9.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, holotype.

Near the next species, *I. callicarpa* Meyrick, but readily distinguished by the large plumbago grey distal marking in the fore wing.

Idiophantis callicarpa Meyrick

Idiophantis callicarpa Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 82.

TULAGI : 24.ix, 1 ♂.

The Solomon Islands specimen is slightly larger than the type female from Samoa, the only other known representative of this species. The dark coloration of the fore wing is of a lighter shade, and the orange streak preceding the whitish subterminal streak is diffuse. These differences seem to indicate that when more material is available for comparison the Solomons examples may prove to represent a distinct race.

DISTRIBUTION. Samoa.

Atasthalistis ochreoviridella (Pagenstecher)

Ceratopora ochreoviridella Pagenstecher, 1900, *Zoologica* (Stuttgart), **12** (No. 29) : 236.
Atasthalistis euchroa Lower, 1900, *Proc. Linn. Soc. N.S.W.* **25** : 47.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 1 ♀, 4–10.x, 4 ♀.

DISTRIBUTION. Australia (Queensland), New Guinea and Bismarck Archipelago.

Anarsia taurella sp. n.

(Pl. 5, fig. 14)

♂ 11 mm. Labial palpus pale cinnamon-buff, first and second segments shaded with greyish sayal brown. Head, thorax and patagia cinnamon-buff. Antenna fuscous-black, annulate with whitish anteriorly ; scape cinnamon-buff. Fore wing cinnamon-buff mixed with light clay colour, a sprinkling of snuff brown scales in middle ; cilia concolorous, paler at tips. Hind wing mouse grey, overlaid with fuscous around margins, hyaline near base ; cilia greyish shaded with pale cinnamon-buff around apex.

Male genitalia : Pl. 11, fig. 10.

GUADALCANAL : Honiara, 6–18.ix, 1 ♂, holotype.

A species of unusual and distinctive coloration for the genus.

Anarsia ulmarata sp. n.

(Pl. 5, fig. 15)

♂ 10 mm. Labial palpus sordid white mixed with fuscous, exterior of second segment marked with a broad, irrorate, fuscous-black streak extending obliquely forward from middle of upper edge, lower margin of exterior broadly edged with fuscous-black, a purplish-black pencil of fine scales on upper margin interiorly, distal two-thirds of interior surface fuscous-black ; terminal segment very small and barely visible. Head, thorax, patagia and tips of broad scales behind antenna and at side of head sordid white ; thorax suffused with greyish fuscous ; patagia strongly suffused with dark fuscous. Antenna and scape sordid white ; flagellum with weak fuscous annulations. Fore wing sordid white diffusedly irrorate with fuscous, a sprinkling of scattered blackish scales, some forming an indefinite blackish dash in plical fold near middle of cell, a similar medial dash at end of cell, a third between this and termen ; middle half of costa marked with greyish fuscous-black ; some indefinite blackish dots around apex and along termen ; cilia concolorous. Legs sordid white, fore and middle legs strongly marked with fuscous-black ; hind leg weakly irrorate with fuscous exteriorly, tibial spurs fuscous-black except at tips.

Male genitalia : Pl. 12, fig. 1.

GUADALCANAL : Honiara, 4–10.x, 1 ♂, holotype.

The male genitalia of this species are very similar to those of *A. reciproca* Meyrick from South India. In general coloration the two species are similar, but in *reciproca* the male has the terminal segment of the labial palpus longer and clearly visible, and in that species veins 7 and 8 in the fore wing are out of vein 6, while in *ulmarata* vein 6 is separate.

Chelaria sp.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂. Abdomen missing.

Chelaria discissa Meyrick

Chelaria discissa Meyrick, 1916, *Exot. Microlep.* **1** : 581.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂. Abdomen missing.

DISTRIBUTION. Australia (Queensland).

Chelaria sp.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀. Abdomen missing.

A species of distinctive coloration and markings, and apparently closely related to *C. meliptila* Meyrick described from New Ireland.

Chelaria arignota Meyrick

Chelaria arignota Meyrick, 1916, *Exot. Microlep.* **1** : 579.

GUADALCANAL : Honiara, 8–18.ix, 3 ♂.

The abdomens of the three specimens from the Solomons are missing, and they are determined as *C. arignota* with reservation until more material becomes available and the genitalia can be examined.

DISTRIBUTION. Upper Burma, Formosa and Java.

Chelaria tephroplintha Meyrick

Chelaria tephroplintha Meyrick, 1923, *Exot. Microlep.* **3** : 30.

GUADALCANAL : Honiara, 8–18.ix, 4 ex., 4–10.x, 1 ex.; Tapenanje, 10–23.xii, 3 ex.

DISTRIBUTION. Fiji and S. Andamans.

Brachyacma palpigera (Walsingham)

Gelechia palpigera Walsingham, 1891, *Trans. ent. Soc. Lond.* **1891** : 94.

GUADALCANAL : Honiara, 8–18.ix, 25 ex., 4–10.x, 5 ex., 6–12.i, 1 ex.; Tapenanje, 10–23.xii, 1 ex.

DISTRIBUTION. A widely distributed tropical and subtropical species in both the Old and New Worlds. The larva feeds in the pods of various trees including *Parkinsonia* and *Cassia* spp.

Brachyacma epiochra Meyrick

Brachyacma epiochra Meyrick, 1886, *Trans. ent. Soc. Lond.* **1886** : 279.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀, 4–10.x, 1 ♂, 1 ♀, 6–12.i, 1 ♀ ; Tapenanje, 10–23.xii, 1 ♂.

DISTRIBUTION. Fiji and New Hebrides.

Telephila indicata Meyrick

Telephila indicata, 1931, *Exot. Microlep.* **4** : 67.

GUADALCANAL : Honiara, 4–10.x, 2 ♂.

DISTRIBUTION. Solomon Is.

Dichomeris pleurophaea (Turner) ?

Eurysara pleurophaea Turner, 1919, *Proc. R. Soc. Queensland*, **31** : 167.

GUADALCANAL : Honiara, 6–12.i, 1 ♀. Abdomen missing.

DISTRIBUTION. Australia (Queensland).

Dichomeris resignata Meyrick

Dichomeris resignata Meyrick, 1929, *Exot. Microlep.* **3** : 510.
Gaesa praeducta Meyrick, 1929, *tom. cit.* p. 511.

GUADALCANAL : Honiara, 8–18.ix, 8 ex.; Tapenanje, 10–23.xii, 4 ex.; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. New Hebrides and Bismarck Archipelago.

Lecithocera palpella sp. n.

(Pl. 6, fig. 2)

♂ 14 mm. Labial palpus somewhat compressed laterally, terminal segment straight and directed posteriad at an obtuse angle, second segment with a projecting apical tuft beneath ; general coloration chamois, first segment and second segment to near apex aniline-black exteriorly and beneath to apex of projecting tuft. Head, thorax, patagia, antenna and scape chamois ; front of head suffused with aniline-black ; area adjacent to compound eye anteriorly, and anterior margin of underside of scape, aniline-black ; patagia aniline-black anteriorly, greyish towards tip. Fore wing chamois, sparsely sprinkled with aniline-black scales, most heavily in terminal area ; a weak, small, aniline-black discal stigma in middle of cell, and a weak transverse concentration of aniline-black scales at end of cell indicating a second stigma (possibly rubbed in specimen); base of costa broadly and strongly marked with aniline-black, a concentration of aniline-black scales from middle of costa to about 4/5 forming a weak, elongate marking; a pre-apical patch of pure ground colour free from dark coloured scales; cilia greyish fuscous, an indistinct fuscous-black sub-basal line, concolorous with wing basally along termen. Hind wing chamois at apex, otherwise greyish cream-buff; cilia greyish. Legs aniline-black.

Male genitalia (Pl. 12, figs. 7, 8): Valva broad basally; cucullus narrow, a little over half width of valva, rounded distally; sacculus narrow, bluntly and irregularly serrate along ventral margin, terminating in a strong, compact comb of setae extending obliquely to a little beyond middle of cucullus. Aedeagus stout, armed with two external, stout tooth-like projections near apex.

GUADALCANAL: Ilu Farm, 26.xii.53–4.i.54, 1 ♂, holotype; Tapenanje, 10–23.xii, 1 ♂.

The form of the labial palpus is a distinctive feature of this species, and is unlike that of other *Lecithocera* species known to me. The species belongs in the group having veins 3 and 4 of the hind wing connate or stalked.

Superficially this species resembles *L. chamela* Turner from Australia, and to a less extent *L. nomaditis* Meyrick from the Solomons; but in both these species the second segment of the labial palpus is not tufted beneath and the terminal segment is slender and gently recurved.

Pachnistis banausopa Meyrick

Pachnistis banausopa Meyrick, 1929, *Exot. Microlep.* **3**: 526.

NEW HEBRIDES: LUGANVILLE, Santo, 3.ix, 1 ♂.

The structure of the male genitalia of this species indicates affinity with *Autosticha enervata* Meyrick and *A. solomonensis* Bradley and certain other species at present in the genus *Autosticha*; and to *Anaptilora eremias* Meyrick and certain other species at present in the genus *Anaptilora*.

DISTRIBUTION. New Hebrides.

Pachnistis sp.

GUADALCANAL: Honiara, 8–18.ix, 2 ♂.

In size and general appearance and in structure of the male genitalia this species is very close to *P. banausopa* Meyrick. Both specimens are damaged and are not considered suitable for description.

Pachnistis phaeoptila sp. n.

(Pl. 6, fig. 3)

♂♀ 15 mm. Labial palpus light warm buff, basal and second segments irrorate with dark mummy brown exteriorly, second segment with a diffuse dark mummy brown subapical annulus, terminal segment with a narrow dark mummy brown annulus at base and a similar but much broader and rather diffuse annulus beyond middle. Head, thorax and tegula warm buff ; a weak suffusion of mummy brown on tegula and thorax. Antenna warm buff ; in male stout, smooth, marked with mummy brown at extreme base ; in female more slender, barred with dark mummy brown, more distinctly in apical half except at apex, basal half with scattered brown except apical margin. Fore wing warm buff, moderately sprinkled with mummy brown ; a strong dark mummy brown marking at base of costa, a similar small dash slightly outwardly-oblique of this ; a bold mummy brown spot in disc before middle at about 2/5, a similar spot slightly obliquely before it in plical fold, and a third larger spot at end of cell ; a series of small mummy brown interneural dots along the terminal margin continuing round apex and along costa to about 3/5, the last two or three spots being slightly larger and more widely spaced ; a very weak pretornal marking ; a small mummy brown dash near base of inner margin (dorsum) ; cilia light warm buff. Hind wing greyish light buff ; cilia matching ; the male with a strong hair-pencil from base beneath. Legs warm buff, irrorate and lightly marked with mummy brown.

Male genitalia : Pl. 12, figs. 9, 10.

Female genitalia : Pl. 13, figs. 1–3.

ONTONG JAVA : Leuaniua, 29.ix, 1 ♂, holotype, 1 ♀, allotype.

Near *P. banausopa* Meyrick, distinguished by its larger size, *P. banausopa* being smaller and only 10–11 mm. across the wings.

Apethistis brunnea sp. n.

(Pl. 6, fig. 4)

♂ 8–9 mm. Labial palpus cream-buff, first and second segments suffused with fuscous exteriorly, terminal segment irrorate with fuscous exteriorly. Head, thorax and patagia fuscous ; thorax with a weak purplish sheen. Antenna fuscous above, cream-buff below ; scape fuscous. Fore wing cream-buff, heavily irrorate with dark fuscous ; stigmata cloudy and obscure, plical slightly basad of first discal, second discal at end of cell in middle ; costa strongly suffused with fuscous at base otherwise narrowly edged with cream-buff to apex ; traces of cloudy interneural submarginal dots round apex and termen ; cilia cream-buff, suffused with greyish at tips and sprinkled with fuscous. Hind wing pale grey ; cilia greyish cream-buff. Abdomen light grey. Legs cream-buff irrorate with fuscous exteriorly except tarsi of fore and hind legs.

Male genitalia : Pl. 13, figs. 4, 5.

TULAGI : 24.ix, 7 ♂, including holotype.

GUADALCANAL : Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

Nearest to *A. sitiens* (Meyrick) originally described from South India in the genus *Brachmia* Hübner but later transferred by Meyrick to the genus *Apethistis* Meyrick on the basis of wing venation. The structure of the male genitalia indicates that it is unlikely either species can remain in *Apethistis*.

Stoeberhinus testaceus Butler

Stoeberhinus testaceus Butler, 1881, *Ann. Mag. nat. Hist.* (5) **7** : 402.

ONTONG JAVA : Leuaniua, 29.ix, 4 ♂.

NEW HEBRIDES : LUGANVILLE, Santo, 3.ix, 1 ♂.

DISTRIBUTION. A widespread species in the Pacific Islands. The larva feeds on dry vegetable matter.

Autosticha solomonensis Bradley

Autosticha solomonensis Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 98.

GUADALCANAL : Honiara, 8–18.ix, 5 ex.; Ilu Farm, 26.xii.53–4.i.54, 7 ex.; Tapenanje, 10–23.xii, 2 ♂, 4 ♀ ; the four female examples are rather small, having a wing span of 10 mm.

ONTONG JAVA : Leuaniua, 29.ix, 1 ♂.

TULAGI : 24.ix, 1 ♂ ; the condition of this specimen is too poor to allow proper comparison, but small differences in the genitalia may be of subspecific importance.

The structure of the male genitalia of this species is very similar to that of *Anaptilora eremias* Meyrick, and it is probable that the two species are congeneric and that future revision will show that they belong together in a separate genus.

DISTRIBUTION. Solomon Is.

Autosticha pelodes (Meyrick)

Automola pelodes Meyrick, 1883, *Ent. mon. Mag.* **20** : 34.

NEW HEBRIDES : LUGANVILLE, Santo, 3.ix, 3 ♀.

DISTRIBUTION. Hawaiian Is., Celebes, Austral Is., Marquesas and New Hebrides. The larva feeds on dead sticks and dry refuse.

Autosticha sp.

GUADALCANAL : Honiara, 4–10.x, 1 ♂. Superficially and structurally near to *A. calceata* Meyrick from China and Ceylon. Evidently an undescribed species but the present specimen is not in sufficiently good condition to warrant description.

Protobathra binotata sp. n.

(Pl. 6, fig. 5)

♂♀ 14–16 mm. Labial palpus drab, slightly darker exteriorly. Front of head pale cream-buff ; crown and thorax drab suffused with fuscous. Antenna and scape fuscous, simple in both sexes, slightly stouter in the male. Fore wing pale drab suffused with fuscous, a heavy dark infuscation at base and along inner margin (dorsum) ; two prominent fuscous-black stigmata, the first a little before middle and slightly nearer costa than inner margin, the second beyond middle at end of cell, slightly larger and midway between costa and inner margin; cilia concolorous, lighter basally. Hind wing light grey; in female weakly suffused with fuscous towards apex; cilia cartridge buff, suffused with fuscous around apex. Legs pale cream-buff, fore and middle legs fuscous or fuscous-black exteriorly.

Male genitalia: Pl. 13, figs. 6, 7.

Female genitalia: Pl. 13, figs. 8–10.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂, holotype; 1 ♀, allotype.

Superficially nearest to *P. coenotypa* Meyrick from Ceylon but having distinctly darker coloration in the fore wing. This species keys to the genus *Protobathra* Meyrick in existing keys based on wing venation, but the structure of the female genitalia differs from that of the type species of the genus.

COSMOPTERYGIDAE

Cosmopteryx dulcivora Meyrick

Cosmopteryx dulcivora Meyrick, 1919, *Exot. Microlep.* **2**: 233.

GUADALCANAL: Honiara, 8–18.ix, 13 ex., 4–10.x, 4 ex., 6–12.i, 4 ex.

YSABEL: Tatamba, 2.x, 2 ex.

DISTRIBUTION. Fiji. The larva mines the leaves of sugarcane.

Cosmopteryx aurella Bradley

Cosmopteryx aurella Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19): 98.

GUADALCANAL: Honiara, 8–18.ix, 1 ex., 4–10.x, 1 ex.; Ilu Farm, 26.xii.53–4.i.54, 1 ex.

DISTRIBUTION. Solomon Is.

Cosmopteryx attenuatella (Walker)

Gelechia attenuatella Walker, 1864, *List. Lep. Ins. B.M.* **30**: 1019.
Cosmopteryx flavofasciata Wollaston, 1879, *Ann. Mag. nat. Hist.* (5) **3**: 438.
Cosmopteryx mimetis Meyrick, 1897, *Proc. Linn. Soc. N.S.W.* **22**: 339.

GUADALCANAL: Honiara, 8–18.ix, 3 ex., 4–10.x, 1 ex.; Ilu Farm, 26.xii.53–4.i.54, 3 ex.

YSABEL: Tatamba, 2.x, 1 ex.

DISTRIBUTION. West Indies, Bermuda, U.S. America (Texas, N. Carolina, Florida and Southern States), Atlantic Islands, Africa (Algeria and Belgian Congo), India, Ceylon and Society Is. The larva has been reported mining leaves of *Cyperus rotundus*.

Labdia albimaculella (Deventer)

Pyroderces albimaculella Deventer, 1904, *Tijdschr. Ent.* **47**: 30.

GUADALCANAL: Honiara, 8–18.ix, 11 ex., 6–12.i, 1 ♀; Tapenanje, 10–23.xii, 1 ♂.

DISTRIBUTION. Java and Borneo.

Labdia semnolitha Meyrick

Labdia semnolitha Meyrick, 1928, *Exot. Microlep.* **3** : 386.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♀.
DISTRIBUTION. New Hebrides.

Labdia saliens Meyrick

Labdia saliens Meyrick, 1928, *Exot. Microlep.* **3** : 285.

ONTONG JAVA : Leuaniua, 29.ix, 2 ex.; Avaha, 30.ix, 1 ex.
DISTRIBUTION. New Hebrides and Solomon Is. (Rennell I.).

Labdia torodoxa solomonensis subsp. n.

(Pl. 6, fig. 6)

Labdia torodoxa Meyrick, 1928, *Exot. Microlep.* **3** : 286.

The examples of this species from the Solomon Islands are superficially similar to those of the nominate race from the New Hebrides, except that in the latter the whitish costal markings of the fore wings tend to be more extensive ; but there are slight comparative differences evident in the genitalia in both sexes, suggesting some degree of subspeciation.

Male genitalia (Pl. 13, fig. 11) : In comparison with *L. torodoxa*, the valva in *solomonensis* is comparatively broad and is not tapered distally ; the heavily sclerotized prong-like part of the gnathus is a little longer ; and the slender, tapered apical portion of the aedeagus is considerably longer.

Female genitalia (Pl. 14, figs. 1–3) : In *solomonensis* the bursa copulatrix contains a weak denticulate patch representing a signum, which is not present in *torodoxa*.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, holotype, 4–10.x, 1 ♂, 1 ♀, allotype.
ONTONG JAVA : Avaha, 30.ix, 1 ♀.

Labdia ochrotypa sp. n.

(Pl. 6, fig. 7)

Labdia torodoxa Meyrick Bradley *nec* Meyrick, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 99 (*partim*).

♂♀ 7–8 mm. Labial palpus cartridge buff, second segment overlaid with fuscous to near apex exteriorly, terminal segment suffused with fuscous at apex exteriorly, sometimes with a thin fuscous medial line from apical suffusion to middle or beyond anteriorly. Head cartridge buff, crown and upper part of face suffused with cream-buff : in examples having darker coloration a diffuse greyish medial line is present ; lower part of face weakly shining tilleul-buff varying to vinaceous-buff. Thorax cartridge buff, tegula fuscous-black. Antenna pale cream-buff ; female with a line of fuscous-black dots anteriorly; male unspotted; scape whitish cartridge buff overlaid with a strong admixture of ochreous yellow. Fore wing fuscous-black; a narrow irregular whitish stripe along inner margin from base to tornus; narrowing and continuing along termen to near apex, outer (dorsal) margin of stripe sometimes overlaid or with a strong admixture of ochreous yellow; in some examples an indication of a whitish strigula on costa a little beyond middle, and a small inconspicuous triangular whitish marking at 4/5; cilia greyish drab around tornus and along termen, some tipped with yellowish or whitish, fuscous-black at apex and beyond; a fuscous-black sub-basal line below apex. Hind wing light drab; cilia greyish drab.

Male genitalia (Pl. 14, fig. 4): Valvae slightly asymmetrical, moderately broad throughout, each with a short seta at or near apex, left valva with a long, flattened, acutely pointed, taper-like projection at middle of dorsal margin.

Female genitalia (Pl. 14, figs. 5–7): Ostium small, situated centrally, shielded by a large, sclerotized, quadrate plate. Bursa copulatrix bearing two moderately large, spiculate signa, roughly pear-shaped and close together.

GUADALCANAL: Tapenanje, 10–23.xii, 2 ♂, including holotype; Honiara, 8–18.ix, 2 ♀, 4.x, 11 ♀, including allotype, 6–12.i, 2 ♂, 1 ♀.

RENNELL I.: Hutuna, 22.xi, 1 ♂.

BELLONA I.: Matahenua, 29.xi, 2 ♀.

Related to *L. torodoxa* Meyrick and superficially very similar, differing only slightly in having the postmedial marking on the costa of the fore wing short and very weak and sometimes absent, while in *torodoxa* this marking is present and may be very pronounced; the pre-apical costal marking also tends to be smaller and paler in *ochrotypa*; in *torodoxa* the labial palpus is not suffused and marked with fuscous as in *ochrotypa*; and in *ochrotypa* the expansible hair-pencil from the base of costa of the hind wing is absent.

Labdia dolomella sp. n.

(Pl. 6, fig. 8)

Labdia torodoxa Meyrick Bradley *nec* Meyrick, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19): 99 (*partim*).

♂♀ 7–8 mm. Superficially similar to the preceding species, *L. ochrotypa* Meyrick, except that in well-marked examples of *ochrotypa* the admixture of ochreous yellow along the outer (dorsal) edge of the whitish dorsal stripe on the fore wing is stronger and more conspicuous. The material available of both species is not in sufficiently good condition to allow a more precise comparison of coloration and markings to be made, and the structure of the genitalia has been used for separating the two species. Differences in the shape of the valvae and the setae of the male, and in the ostium and signa of the female are shown in the illustrations.

Male genitalia (Pl. 14, fig. 8): Valvae asymmetrical, expanded distally, the right valva longer, each with a moderately large seta at or near apex, the seta on the right valva being twice as long as the seta on the left valva.

Female genitalia (Pl. 14, figs. 9–11): Ostium situated caudally, exposed, sterigma not strongly sclerotized. Two large spiculate signa, situated on opposite sides of the bursa and connected caudally by a narrow spiculate band.

RENNELL I.: Hutuna, 12.xi, 2 ♂, including holotype, 18–25.x, 1 ♂, 4 ♀, including allotype, 1–5.xi, 4 ♀, 30.x–2.xi, 2 ♂; Onegaghugha, 28.x, 2 ♀.

This species and *L. ochrotypa* are closely related to *L. torodoxa* Meyrick, with which both have previously been confused.

Labdia psarodes sp. n.

(Pl. 6, fig. 9)

♂♀ 9–10 mm. Superficially similar to the species described above, *L. ochrotypa* Bradley, but slightly larger and differing in the following respects: the dark coloration of the fore wing is lightened by an admixture of white and fuscous and in general appearance is distinctly greyish; a small inconspicuous white spot may be present at the middle of the costa and a similar triangular spot at 4/5; only a weak suffusion of cream-buff may be present along the outer edge of the dorsal streak; a moderately heavy fuscous-black dash is present in the plical fold on the inner edge of the white dorsal streak, preceded by a small dash below the plical fold at about 2/3.

Male genitalia (Pl. 15, fig. 1): Valva constricted near base, expanded distally, lacking specialized setae at apex.

Female genitalia: not known.

GUADALCANAL: Ilu Farm, 26.xii.53–4.i.54, 3 ♂, including holotype, 2 ♀; Honiara, 8–18.ix, 1 ♀, 4–10.x, 1 ♂.

The abdomens of all the female paratypes are missing.

Labdia calypta sp. n.

(Pl. 6, fig. 10)

♂♀ 9–11 mm. Labial palpus white, second segment with a broad subdorsal fuscous-black stripe reaching nearly to apex exteriorly, terminal segment with three fuscous-black bands: a narrow basal, a moderate submedial and a broad subapical. Front of head (face) shining white; fore part of crown clothed with smooth, weakly iridescent, pale cream-buff and greyish scales; middle and posterior of crown white strongly intermixed with loosely appressed bister scales. Antenna white, with fuscous-black annuli, suffused fuscous-black at base and with a broad fuscous-black apical band at about 5/6; scape white, marked with fuscous-black apical and subbasal patches. Fore wing deep chrome, markings hair brown sprinkled with whitish and irregularly edged with black irroration; a broad outwardly-oblique fascia occupying basal third, broken and interrupted at middle; a triangular marking on costa at about 3/4; a narrow subterminal fascia from tornus, diffuse at middle of termen, widening below apex and encircling a small variable patch of ground colour; cilia chrome yellow from apex of wing to near middle of termen, thence greyish.

Hind wing light fuscous ; cilia greyish. Abdomen hair brown above, shining white below ; a small cream-buff anal tuft in male. In the male a long, cream-buff hair-pencil arises from the metathorax below the base of the hind wing and projects caudally, curving upwards over the abdomen and when not expanded has the end inserted in a specialized pocket or groove medio-dorsally on the third abdominal segment ; illustrated on Pl. 11, figs. 5, 6.

Male genitalia : Pl. 15, fig. 2.

Female genitalia : Pl. 15, figs. 3, 4.

GUADALCANAL : Honiara, 8–18.ix, 4 ♂, 2 ♀, 4–10.x, 3 ♀, 6–12.i, 4 ♂, including holotype, 1 ♀, allotype ; Tapenanje, 10–23.xii, 1 ♀ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♀.

YSABEL : Tatamba, 2.x, 1 ♂.

In coloration and general appearance very similar to the Fijian species *L. spirocosma* Meyrick, but may be distinguished as follows : in *spirocosma* the base of the medial fascia of the fore wing is connected to the upper (costal) part of the postmedial fascia which in *calypta* is represented by a triangular patch on the costa.

Labdia helena Meyrick

Labdia helena Meyrick, 1928, *Exot. Microlep.* **3** : 288.

GUADALCANAL : Honiara, 6–12.i, 1 ♂, 1 ♀ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. New Ireland.

Labdia isomerista sp. n.

(Pl. 6, fig. 11)

♂ 8 mm. Labial palpus white, terminal segment suffused with pale baryta yellow. Head white, crown and upper part of face suffused and overlaid with baryta yellow. Thorax and tegula baryta yellow, tegula suffused with xanthine orange. Antenna maize yellow, dotted above with fuscous ; scape white suffused with maize yellow above, a small fuscous irroration at apex ; pecten maize yellow. Fore wing baryta yellow, a broad outwardly-oblique basal fascia with outer edge well defined, sinuate and reaching from costa at 1/4 to beyond middle of inner margin (dorsum), basal (proximal) margin of fascia diffuse, coloration of fascia sudan brown from costa to near middle of wing, an admixture of xanthine orange at middle increasing towards inner margin, outer edge of fascia broadly edged with white from costa to near inner margin, confluent on costa with one or two short oblique white streaks ; a small dark grey costal strigula at about 3/5 edged with white ; a conspicuous golden-metallic dot on lower part of terminal margin ; a weak silvery-white flash at apex, a similar small dash on costa mixed with dark grey ; cilia baryta yellow, dark around apex, pale along termen, a fuscous dot below apex. Hind wing and cilia sordid white. A specialized dorsal cavity containing broad, seta-like scales on third abdominal segment ; illustrated on Pl. 15, fig. 8.

Male genitalia : Pl. 15, fig. 7.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂, holotype.

A species of distinctive appearance, perhaps nearest to *L. helena* Meyrick among the species of *Labdia* occurring in the Solomons.

Labdia sp.

GUADALCANAL: Honiara, 6–12.i, 1 ♀. In poor condition. Belonging to a species near *L. albilineella* Deventer, but smaller and with vertex of head white.

Labdia sp.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂, 2 ♀, 4–10.x, 2 ♀. Belonging to a species near *L. oxychlora* Meyrick.

Labdia aprepes sp. n.

(Pl. 6, fig. 12)

♂♀ 7–9 mm. Labial palpus whitish, basal and second segments suffused with fuscous or fuscous-black to near apex of second, most heavily exteriorly, terminal segment similarly suffused anteriorly and at apex. Head, thorax, antenna and scape whitish; front of head (face) suffused with greyish fuscous; a diffuse greyish fuscous medial line extending from anterior of crown to posterior of thorax; tegula fuscous-black; anterior edge of antenna dotted with fuscous-black. Fore wing fuscous-black, a rather thick whitish streak along inner margin from base to tornus, attenuated in tornal area, inner edge weakly dentate; in some examples an admixture of cream-buff along inner margin (dorsum); a small whitish costal spot at 3/4; cilia greyish, shaded with fuscous at apex and with a broad fuscous-black sub-basal bar. Hind wing light drab; cilia greyish drab.

Male genitalia: Pl. 15, fig. 9.

Female genitalia: Pl. 16, figs. 1–3.

GUADALCANAL: Tapenanje, 10–23.xii, 11 ♂, including holotype, 2 ♀; Honiara, 8–18.ix, 1 ♂, 4 ♀, including allotype.

Related to the Australian species *L. promarcha* Meyrick, and having similar fore wing pattern but darker coloration.

Labdia holopetra Meyrick ?

Labdia holopetra Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 90.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂.

DISTRIBUTION. Samoa.

Labdia sp.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂. Belonging to a species near *L. gypsodelta* Meyrick.

Proterocosma triplanetis Meyrick

Proterocosma triplanetis Meyrick, 1886, *Trans. ent. Soc. Lond.* **1886** : 293.

GUADALCANAL : Tapenanje, 10–23.xii, 2 ♂, 1 ♀.

The three Solomon Islands specimens are more distinctly marked than are the type from Fiji, and two examples from Samoa in which the fore wing markings are even more obsolescent than in the type. These differences indicate possible subspeciation between the island groups, but this may be better understood when more material becomes available and genitalic comparisons can be made.

DISTRIBUTION. Fiji, Samoa and New Hebrides.

Pyroderces falcatella (Stainton)

Gracilaria ? falcatella Stainton, 1859, *Trans. ent. Soc. Lond.* **5** : 121.

GUADALCANAL : Honiara, 8–18.ix, 7 ex., 4–10.x, 3 ex. ; Tapenanje, 10–23.xii, 1 ex.

DISTRIBUTION. A widespread species in the Indo-Australian region. The larva feeds in cotton shoots and in the pods of *Parkinsonia aculeata* and other plants.

Pyroderces dendrophaga Meyrick

Pyroderces dendrophaga Meyrick, 1920, *Exot. Microlep.* **2** : 318.

GUADALCANAL : Honiara, 8–18.ix, 22 ex., 4–10.x, 9 ex.

DISTRIBUTION. Australia (Queensland).

Pyroderces sp.

GUADALCANAL : Tapenanje, 10–23.xii, 8 ex.

A distinctive and probably undescribed species, but as there is no male specimen with an abdomen in the series I refrain from describing the species for the present.

Pyroderces phaeostigma sp. n.

(Pl. 6, fig. 13)

♂♀ 9–10 mm. Labial palpus cartridge buff, second segment heavily, terminal segment lightly, suffused with fuscous-black exteriorly. Head and thorax cream-buff or cartridge buff clouded with chaetura drab ; a broad, diffuse, chaetura drab medial line on crown ; tegula cream-buff mixed with fuscous, fuscous-black at base. Antenna and scape cream-buff or cartridge buff. Fore wing cream-buff mixed and suffused with fuscous and with a few fuscous-black markings ; a broad fuscous area along plical fold merging with a narrow fuscous-black dash above tornus ; a conspicuous fuscous-black discal stigma narrowly ringed with cream-buff ; a large cream-buff costal spot at about 3/5 reaching obliquely towards discal stigma ; a small cream-buff dot at 4/5 ; a narrow, sinuous cream-buff streak along inner margin and around tornus; cilia fuscous-black around apex and along termen, hair brown around tornus, sometimes three or four very small cream-buff dots at base of cilia along termen. Hind wing and cilia drab.

Male genitalia: Pl. 16, fig. 4.

Female genitalia: Pl. 16, figs. 5, 6.

GUADALCANAL: Honiara, 8–18.ix, 2 ♂, including holotype, 3 ♀, including allotype, 4–10.x, 1 ♂.

Near *P. syngalactis* Meyrick from the New Hebrides, but readily distinguished by the discal stigma being comparatively conspicuous.

Pyroderces megacentra Meyrick

Pyroderces megacentra Meyrick, 1923, *Exot. Microlep.* **3**: 59.

GUADALCANAL: Honiara, 8–18.ix, 1 ♀.

DISTRIBUTION. Fiji, New Guinea. The larva feeds in the flowers of *Pandanus*.

Idiostyla oculata Meyrick

Idiostyla oculata Meyrick, 1921, *Exot. Microlep.* **2**: 412.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂.

DISTRIBUTION. Fiji.

Limnaecia atopa Bradley

Limnoecia [*sic*] Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19): 101.

GUADALCANAL: Honiara, ix and x, 12 ex.; Tapenanje, 10–23.xii, 1 ♂, 1 ♀; Ilu Farm, 26.xii.53–4.i.54, 3 ex.

DISTRIBUTION. Solomon Is.

Limnaecia arsitricha Meyrick

Limnoecia [*sic*] *arsitricha* Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2: 93.

GUADALCANAL: Honiara, 8–18.ix, 4–10.x, 6–12.i, 15 ♂♀; Tapenanje, 10–23.xii, 1 ♀; Ilu Farm, 26. xii, 53–4. i. 54, 2 ♂, 1 ♀.

YSABEL: Tatamba, 2.x.1953, 1 ♂.

ONTONG JAVA: Leuaniua, 29.ix, 1 ♀; Avaha, 30.ix, 2 ♀.

DISTRIBUTION. Samoa and New Hebrides.

Limnaecia argophylla sp. n.

(Pl. 6, fig. 14)

♂ 9 mm. Labial palpus, head, thorax and tegula shining white. Antenna cartridge buff; scape white. Fore wing white, markings hair brown; a short, thick, very oblique streak from base of costa to about 1/3; a similar less oblique linear streak from before middle reaching nearly to tornus ; a broad diffuse streak from inner angle to near middle a little above and parallel to inner margin (dorsum) ; cilia white, blackish at apices around apex and along termen, wholly greyish below tornus. Hind wing drab ; in male an expansible tuft of very long warm buff hairs from near base of costa ; cilia light hair brown.

Male genitalia : Pl. 16, fig. 7.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂, holotype.

The white coloration and simple markings of the fore wing make this species distinctive. It is perhaps a near relative of *L. arsitricha* Meyrick, the male of which has a similar expansible tuft on the hind wing.

Limnaecia melliplanta Bradley

Limnoecia [*sic*] ***melliplanta*** Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 100.

GUADALCANAL : Honiara, 8–18.ix, 4–10.x, 11 ex.; Tapenanje, 10–23.xii, 1 ex.

TULAGI : 24.ix, 1 ex.

DISTRIBUTION. Solomon Is.

Limnaecia perpusilla sp. n.

(Pl. 6, fig. 15)

♂♀ 6–7 mm. Labial palpus white, second segment suffusedly ringed with fuscous-black at apex, terminal segment fuscous-black anteriorly except at apex. Head, thorax and tegula white ; upper part of face, crown, thorax and tegula diffusedly irrorate with fuscous and fuscous-black. Antenna fuscous, with weak, fuscous-black annuli ; clothed with appressed scales basally, rough-scaled in apical half ; scape whitish, marked with fuscous-black anteriorly and posteriorly except at apex. Fore wing white, diffusedly irrorate and mixed with fuscous-black ; narrow, diffuse and weakly irrorate white fasciae at 1/3, middle and 3/4, most distinct on costa ; sometimes an admixture of blackish in middle of wing preceding each fascia ; cilia hair brown, mixed with whitish at apex and with fuscous on costa. Hind wing and cilia light hair brown.

Male genitalia : Pl. 16, fig. 8.

TULAGI : 24.ix, 11 ex., including holotype ♂, allotype ♀.

GUADALCANAL : Honiara, 4–10.x, 1 ♂.

Near to *L. microglypta* Meyrick, but without the dark apical spot on the fore wing as in that species, and also lacking the expansible hair-pencil beneath the hind wing in the male.

Ascalenia armigera Meyrick

Ascalenia armigera Meyrick,1923, *Exot. Microlep.* **3** : 60.

GUADALCANAL : Honiara, 6–12.i, 1 ♂.

DISTRIBUTION. Fiji.

Batrachedra arenosella (Walker)

Gracilaria arenosella Walker, 1864, *List. Lep. Ins. B.M.* **30** : 857.
Batrachedra psilopa Meyrick, 1907, *J. Bombay. nat. Hist. Soc.* **17** : 982.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 4–10.x, 11 ex. ; Ilu Farm, 26.xii.53–4.i.54, 2 ♂.

ONTONG JAVA : Avaha, 30.ix, 1 ♂.

DISTRIBUTION. A common species associated with the flowers of the coconut (*Cocos nucifera*) in the Indo-Australian region and in South America.

Batrachedra eurema Bradley

Batrachedra eurema Bradley, 1956, *Bull. Brit. Mus.* (*nat. Hist.*), *Ent.* **4** : 152.

GUADALCANAL : Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

This species was originally described from a solitary female from Lord Howe I. The male specimen from Guadalcanal is smaller, measuring only 10 mm. across the fore wings as compared with 16 mm., and has a dense patch or epaulet of scales at the inner angle of the fore wing, but otherwise superficially resembles the female and is probably conspecific.

DISTRIBUTION. Lord Howe I.

XYLORYCTIDAE

Cryptaphasa eumorpha Turner

Cryptaphasa eumorpha Turner, 1897, *Ann. Queensland Mus.* **4** : 9.
Cryptaphasa aggesta Meyrick, 1925, *Exot. Microlep.* **3** : 147.

GUADALCANAL : Honiara, 8–18.ix 1 ♂.

DISTRIBUTION. Australia (Queensland), New Guinea (Papua), Rook I. and Dampier I.

Epimactis pulsatella sp. n.

(Pl. 7, fig. 1)

♂ 16 mm. Labial palpus white, basal segment and exterior basal two-thirds of second segment fuscous, apex of third segment tipped with fuscous. Head, thorax and tegula white. Antenna ciliate, ciliations about as long as width of shaft ; white-scaled at base ; scape white. Fore wing white, anterior edge of costa cream-buff ; a small, fuscous, discal stigma a little above middle at 1/3, a similar stigma obliquely below in plical fold, and a third at end of cell at about middle ; a subterminal line of small, fuscous, interneural dots around apex and along termen ; cilia (worn on type) white. Hind wing and cilia white.

Male genitalia : Pl. 16, figs. 9, 10.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂, holotype.

Related to *E. talantias* Meyrick, found in India and Ceylon. Both species are very similar superficially but differ in male genitalia as follows: in *talantias* the finger-like projection of the sacculus is more slender and is longer, reaching almost beyond the apical projection.

COPROMORPHIDAE

Copromorpha tetrarcha Meyrick

Copromorpha tetrarcha Meyrick, 1916, *Exot. Microlep.* **1** : 555.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

The two Guadalcanal specimens are smaller and differ considerably in coloration (having the ground colour of the fore wings white) from specimens in the museum collections from the islands of Choiseul and Bougainville.

DISTRIBUTION. Solomon Is.

HELIODINIDAE

Hieromantis albata (Meyrick)

Stathmopoda albata Meyrick, 1913, *Exot. Microlep.* **1** : 94.

GUADALCANAL : Honiara, 8–18.ix, 1 ex., 4–10.x, 3 ex., 6–12.i, 1 ex.

TULAGI : 24.ix, 1 ex.

DISTRIBUTION. Australia (Queensland), New Guinea, Sudest I.

Hieromantis resplendens Bradley

Hieromantis resplendens Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 102.

GUADALCANAL : Honiara, ix.53 and i.54, 4 ♀; Ilu Farm, 26.xii.53–4.i.54, 1♂, 1 ♀.

YSABEL : Tatamba, 2.x, 1 ♂.

DISTRIBUTION. Solomon Is.

Zarathra sp.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ex.

Stathmopoda haplophanes sp. n.

(Pl. 7, fig. 2)

♀ 12 mm. Labial palpus orange-yellow. Front of head smooth-scaled, shining pale orange-yellow, weakly iridescent; crown, thorax and tegula light raw sienna. Antenna pale orange-yellow suffused and overlaid with fuscous from about 1/4, becoming heavier and darker towards apex; annulations light fuscous near base, darker and more distinct towards middle, indistinct and obliterated by suffusion in apical third. Fore wing coloration uniform light raw sienna, anterior edge of costa dark fuscous near base—not fully visible viewed from above ; cilia hair brown mixed with light raw sienna at base. Hind wing shining drab ; cilia hair brown. Abdomen somewhat shining hair brown above, cream-buff below. Legs cream-buff, middle and hind legs suffused with pale orange-yellow exteriorly, hind leg light raw sienna above, obscurely barred with hair brown at origin of spurs and at apex of first tarsal segment.

Female genitalia : Pl. 17, figs. 1–3.

GUADALCANAL : Honiara, 8–18.ix, 2 ♀, holotype and paratype.

Near *S. luculenta* Meyrick from Assam, and distinguished by the coloration of the head, the front and vertex of which is shining whitish ochreous in *luculenta*.

Stathmopoda moschlosema sp. n.

(Pl. 7, fig. 3)

♂♀ 10–11 mm. Labial palpus shining whitish suffused with fuscous, darker exteriorly. Head with face smooth-scaled, shining whitish-bronze ; fore part of head (between antennae) and crown shining bronze with a weak purplish sheen most evident on crown. Thorax and tegula shining deep purplish-grey ; a small, subdorsal, mustard yellow dot on each side of the thorax posteriorly. Antenna and scape dark purplish-grey ; pectinations longer than width of shaft in male ; in female simple. Fore wing shining deep purplish-grey, a narrow, slightly inwardly-oblique mustard yellow fascia at 1/3, strongly edged with black; a similar, slightly broader, outwardly-oblique fascia at 2/3, sometimes narrowed at inner margin ; apical third of wing with a strong bronzy sheen ; cilia mouse grey. Hind wing fuscous ; cilia mouse grey. Abdomen dark fuscous above, white below ; segmental margins edged posteriorly with silvery-white above and at side. Legs white, with weak violaceous reflections ; fore leg suffused with fuscous or purplish-black ; middle leg with coxa suffused with purplish-black, tibia with purplish-black bands at base of spurs, spurs similarly suffused exteriorly ; hind leg with broad purplish-black bands and whorls of long bristles at origin of spurs, tarsus with a similar apical band on the first segment and whorls of shorter bristles on first and second joints, and with the second segment wholly and the third segment to near apex purplish fuscous.

Male genitalia : Pl. 17, figs. 4–6.

Female genitalia : Pl. 17, figs. 7–9.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 1 ♀, allotype, 6–12.i, 5 ♂, including holotype, 2 ♀ ; Tapenanje, 10–23.xii, 5 ♂, 1 ♀.

Near the Asiatic species *S. anconias* Meyrick, and distinguished by having the fascia at 2/3 on the fore wing directly transverse and not with the outer edge deeply indented at the middle as in *anconias*.

Stathmopoda caveata Meyrick

Stathmopoda caveata Meyrick, 1913, *Exot. Microlep.* **1** : 92.

GUADALCANAL : Honiara, 4–10.x, 1 ♂, 1 ♀.

DISTRIBUTION. New Guinea.

Stathmopoda imperator Bradley

Stathmopoda imperator Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 103.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀.
YSABEL : Tatamba, 2.x, 1 ♀.
DISTRIBUTION. Solomon Is.

Stathmopoda periclina Meyrick

Stathmopoda periclina Meyrick, 1938, *Trans. R. ent. Soc. Lond.* **89** : 520.

GUADALCANAL : Honiara, 8–18.ix, 3 ex., 5–11.i, 1 ex.
YSABEL : Tatamba, 2.x, 9 ex.
DISTRIBUTION. New Guinea and Solomon Is.

Stathmopoda dracaenopa Meyrick

Stathmopoda dracaenopa Meyrick, 1933, *Exot. Microlep.* **4** : 430.

GUADALCANAL : Honiara, 6–12.i, 1 ♀.
DISTRIBUTION. Fiji and Guam.

Stathmopoda tetrazyga Meyrick

Stathmopoda tetrazyga Meyrick, 1936, *Exot. Microlep.* **4** : 618.

GUADALCANAL : Honiara, 8–18.ix, 2 ♀ ; Tapenanje, 10–23.xii, 1 ♂.
DISTRIBUTION. Solomon Is.

Stathmopoda nucivora Meyrick

Stathmopoda nucivora Meyrick, 1932, *Exot. Microlep.* **4** : 272.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.
TULAGI : 24.ix, 1 ♂.
DISTRIBUTION. Solomon Is.

Stathmopoda anticyma Meyrick

Stathmopoda anticyma Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 100.

ONTONG JAVA : Leuaniua, 29.ix, 2 ♀.
DISTRIBUTION. Samoa and Solomon Is.

Stathmopoda cornutella sp. n.

(Pl. 7, fig. 4)

♂ 12 mm. Labial palpus light buff, suffused with warm buff exteriorly. Head with face light buff with a violaceous sheen, crown and upper part of face antimony yellow, a small flame scarlet spot in middle of crown. Thorax and tegula antimony yellow mixed with yellow ochre, anterior margin of thorax broadly edged with flame scarlet laterally, and a subdorsal flame scarlet spot at middle. Fore wing warm buff, an admixture of yellow ochre at base, a moderate, interrupted, ochraceous-orange medial line from near base to discal area, a similar indefinite line along plical fold; a distinct, somewhat elongate, buckthorn brown discal spot in middle at about 3/4; cilia greyish warm buff. Hind wing greyish buffy brown; cilia concolorous, somewhat darker towards apex.

Male genitalia (Pl. 17, figs. 10, 11): The large and numerous cornuti present in the aedeagus are an unusual feature for this genus.

GUADALCANAL: Ilu Farm, 26.xii.53–4.i.54, 1 ♂, holotype.

Nearest to *imperator* Bradley, also described from the Solomons, but distinguished at once by the lighter coloration of the fore wing, which in *imperator* is drab.

Stathmopoda electrantha Meyrick

Stathmopoda electrantha Meyrick, 1927, *Exot. Microlep.* **3**: 377.
Stathmopoda transvecta Meyrick, 1927, *tom. cit.* p. 377. ***Syn. nov.***

GUADALCANAL: Honiara, 8–18.ix, 4 ex., 6–12.i, 12 ex.; Tapenanje, 10–23.xii, 2 ex.

YSABEL: Tatamba, 2.x, 4 ex.

The new synonymy above is introduced following an examination of type material in the British Museum (Natural History).

DISTRIBUTION. New Hebrides.

Thylacosceles pithanodes sp. n.

(Pl. 7, fig. 5)

♂ 8 mm. Labial palpus and head white, crown tinted with pale cream-buff. Antenna white, dark fuscous at base anteriorly; scape white, distal half dark fuscous exteriorly. Thorax white, tegula purplish fuscous. Fore wing fuscous, apical and distal areas darker; a strong admixture of bluish iridescent scales in dorsal half and in apical and distal areas; a triangular cartridge buff spot on costa at 2/3; cilia greyish fuscous. Hind wing and cilia greyish fuscous. Legs white, posterior tibia with a black apical band and fuscous-black dorsal tuft.

Male genitalia: Pl. 17, figs. 12, 13.

GUADALCANAL: Tapenanje, 10–23.xii, 2 ♂, including holotype.

Related to *T. judex* Meyrick from Ceylon, and distinguished by the white head, not fuscous as in *judex*, and by the absence of the two subapical bands on the antenna, present in *judex*.

Pachyrhabda sp.

GUADALCANAL: Honiara, 8–18.ix, 3 ex.; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

A species of distinctive superficial appearance, having the fore wing coloration greyish, the front and fore part of head white and the crown deep chocolate colour, It is probably undescribed but the present material is not in sufficiently good condition for descriptive purposes.

Pachyrhabda amianta Meyrick

Pachyrhabda amianta Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 101.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ex.; Honiara, 4–10.x, 1 ex.
DISTRIBUTION. Samoa.

Pachyrhabda phanta Bradley

Pachyrhabda phanta Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.*, **2** (19) : 104.

GUADALCANAL : Honiara, 4–10.x, 4 ex.; Tapenanje, 10–23.xii, 8 ex.; Ilu Farm, 26.xii.53–4.i.54, 1 ex.
TULAGI : 24.ix, 2 ex.
DISTRIBUTION. Solomon Is.

GLYPHIPTERYGIDAE

Tortyra libanota Meyrick

Tortyra libanota Meyrick, 1910, *Trans. ent. Soc. Lond.* **1910** : 463.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♀.
DISTRIBUTION. Australia (Queensland), New Guinea and Solomon Is.

Tortyra iridopa Meyrick

Tortyra iridopa Meyrick, 1907, *Proc. Linn. Soc. N.S.W.* **32** : 97.

YSABEL : Tatamba, 2.x, 1 ♀.
DISTRIBUTION. Solomon Is. and New Guinea (Papua).

Simaethis cyanotoxa Meyrick

Simaethis cyanotoxa Meyrick, 1907, *Proc. Linn. Soc. N.S.W.* **32** : 113.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.
DISTRIBUTION. Solomon Is.

Choreutis diana sp. n.

(Pl. 7, fig. 6)

♂♀ 10–11 mm. Labial palpus with tuft of second segment formed of two whorls of long, projecting, fuscous white-tipped scales ; terminal segment fuscous sprinkled with white. Head, thorax and tegula drab sprinkled with white ; front of head (face) mixed with white ; base of tegula strongly suffused with white. Antenna white, with black annuli ; scape fuscous. Fore wing drab or light fuscous, markings formed of white irroration ; basal area of wing in worn condition in specimens studied but there is evidence of two very diffuse transverse shades towards base and of a radiate-dentate line at 1/3 forming a white dot on costa ; an irregular transverse linear marking at 2/3 interrupted at middle and forming a reticulate white dot on costa ; distal area of wing almost completely enmeshed in a network of fine white lines ; cilia drab or light fuscous, with a bronzy sheen ; a small white dot on costa before apex followed by a chain of alternate large black and small white chequers around apex and along termen to tornus occupying basal half of cilia. Hind wing coloration similar to that of fore wing terminal area except at apex irrorate with white ; coloration and markings of cilia similar to those of fore wing. Legs white, with fuscous-black markings.

Male genitalia : Pl. 18, figs. 4, 5.

Female genitalia : Pl. 18, figs. 1–3.

GUADALCANAL : Honiara, 4–10.x, 1 ♀, holotype, 1 ♂, allotype.

Near *C. moniligera* Meyrick, occurring in India and Java, and may be distinguished by the black and white chequered markings of the cilia, which in *moniligera* are only present in the upper half of the fore wing and not along the whole length of the termen in both fore and hind wings as in *diana*.

I name this species after my wife.

Glyphipteryx ditiorana (Walker)

Sciaphila ? ditiorana Walker, 1863, *List. Lep. Ins. B.M.* **28** : 348.

GUADALCANAL : Honiara, 8–18.ix, 1 ♀, 6–12.i, 2 ♀.

DISTRIBUTION. South Africa, Mauritius and Indo-Malayan region.

Glyphipteryx sp.

GUADALCANAL : Honiara, 6–12.i, 1 ♂.

YSABEL : Tatamba, 2.x, 1 ♂.

Both specimens are in poor condition but apparently belong to an undescribed species related to *G. stilata* Meyrick, which occurs in Fiji.

Metapodistis sp.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.

BLASTOBASIDAE

Blastobasis sciota sp. n.

(Pl. 7, fig. 7)

♂♀ 11–16 mm. Labial palpus warm buff ; in male diffusedly irrorate with fuscous exteriorly, irroration weak at apices of second and terminal segments ; in female diffusedly irrorate with fuscous, irroration weaker interiorly and at apices of second and terminal segments ; male slightly stouter than female and with terminal segment about 2/3 length of second. Head, thorax and tegula warm buff varying to light buff ; lower part of face sometimes greyish tinged ; crown, thorax and tegula suffused or irrorate with fuscous, anterior margin of thorax and base of tegula darker. Antenna and scape warm buff ; scape lightly irrorate with fuscous ; basal 2/3 of antenna wholly suffused with dark fuscous ; male with deep notch at base. Fore wing warm buff varying to light buff, diffusedly irrorate with fuscous ; markings poorly defined and not always apparent ; discal stigmata dark fuscous or fuscous-black, first usually absorbed in a fascia of dark fuscous suffusion from before middle ; small, cloudy, dark fuscous or fuscous-black spots on costa and inner margin opposite second discal ; dark fuscous marginal dots around apex and along termen, often merged in general dark suffusion ; base of costa suffused with dark fuscous ; cilia warm buff or light buff at base along termen, otherwise hair brown sprinkled with whitish points. Hind wing warm buff suffused with fuscous, paler towards base ; cilia drab, warm buff at base.

Male genitalia : Pl. 18, figs. 6, 7.

Female genitalia : Pl. 18, figs. 8–10.

GUADALCANAL : Tapenanje, 10–23.xii, 4 ♂, 6 ♀, including holotype ♂, and allotype ♀ ; Honiara, 8–18.ix, 2 ♂, 1 ♀, 4–10.x, 1 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

Closely related and superficially similar to *B. spermologa* Meyrick. The two species may be separated on male genitalia as follows : in *sciota* the uncus is narrowly tapered throughout its length, in *spermologa* it is distended towards the tip and is stouter than at the base and is obtusely pointed.

HYPONOMEUTIDAE

Prays nephelomima Meyrick

Prays nephelomima Meyrick, 1907, *Proc. Linn. Soc. N.S.W.* **32** : 76.

ONTONG JAVA : Leuaniua, 29.ix, 2 ♀.

YSABEL : Tatamba, 2.x, 2 ♀.

The two Solomon Islands specimens probably belong to this Australian species which is distinct from the Palaearctic species *P. citri* Millière and not a synonym as has been considered by some authors.

Atteva mathewi (Butler)

Corinea mathewi Butler, 1887, *Ann. Mag. nat. Hist.* (5) **20**: 414.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♀.

DISTRIBUTION : Solomon Is.

GRACILLARIIDAE

Acrocercops spp.

The genus *Acrocercops* Wallengren (*sens. lat.*) is represented by many species in the Solomons. The moths come readily to light, but unfortunately much of the material collected by this method is very worn, and many species remain unidentified.

Acrocercops euthycolona Meyrick

Acrocercops euthycolona Meyrick, 1931, *Exot. Microlep.* **4** : 46.

GUADALCANAL : Honiara, 4–10.x, 1 ♂.

DISTRIBUTION. Java, India, Malaya and Solomon Is. (Rennell I.). The larva mines blotches in leaves of *Bassia latifolia* in India, and *Mimusops elangi* (Sapotaceae) in Java and Malaya.

Acrocercops sp.

GUADALCANAL : Honiara, 4–10.x, 1 ♂, abdomen missing.

A strikingly marked species, most closely resembling the Fijian species *A. patellata* Meyrick.

Acrocercops homalacta Meyrick

Acrocercops homalacta Meyrick, 1927, *Insects of Samoa*, **3**, Lep. fasc. 2 : 107.

GUADALCANAL : Honiara, 8–18.ix, 1 ex. (damaged), 4–10.i, 1 ♂; Tapenanje, 10–23.xii, 1 ex.; Ilu Farm, 26.xii.53–4.i.54, 3 ex.

DISTRIBUTION. Samoa and Solomon Is. (Rennell I.).

Acrocercops cramerella (Snellen)

Gracilaria cramerella Snellen, 1904, *Tijdschr. Ent.* **46**: 84.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.

DISTRIBUTION. Widespread in the Indo-Australian region. The larva feeds in the pods of cocoa (*Theobroma cacao*), and in the top-shoots of the Litchi tree (*Nephelium litchi*), and has been reported mining leaves of various other trees.

Acrocercops strophala Meyrick

Acrocercops strophala Meyrick, 1908, *J. Bombay nat. Hist. Soc.* **18** : 824.

GUADALCANAL : Honiara, 4–10.x, 2 ♂, 8–18.ix, 1 ♀.

DISTRIBUTION. Samoa, Java, Ceylon, India and Assam. The larva is known to mine blotches under the upper cuticle of the leaf of *Glochidion lanceolarium* (Euphorbiaceae).

Acrocercops caerula (Meyrick)

Cyphosticha caerula Meyrick, 1912, *Exot. Microlep.* **1** : 296.
Cyphosticha centrometra Meyrick, 1920, op. cit. **2** : 296.

ONTONG JAVA : Leuaniua, 29.ix, 4 ex.

DISTRIBUTION. West Africa, India, Fiji and Guam.

Acrocercops brochogramma Meyrick

Acrocercops brochogramma Meyrick, 1914, *Exot. Microlep.* **1** : 285.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 2 ♂.
DISTRIBUTION. Ceylon.

Acrocercops apicella Bradley

Acrocercops apicella Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 107.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 2 ♀.
DISTRIBUTION. Solomon Is. (Rennell I.).

Acrocercops serriformis Meyrick

Acrocercops serriformis Meyrick, 1930, *Exot. Microlep.* **3** : 580.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 6–12.i, 1 ♀.
DISTRIBUTION. Java.

Acrocercops brachyglypta Meyrick

Acrocercops brachyglypta Meyrick, 1931, *Exot. Microlep.* **4** : 48.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂, 4–10.x, 5 ♂.
DISTRIBUTION. Samoa, Solomon Is. (Rennell I. and Bellona I.).

Acrocercops albidorsella Bradley

Acrocercops albidorsella Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 107.

GUADALCANAL : Honiara, 4–10.x, 1 ♂.
DISTRIBUTION. Solomon Is. (Rennell I.).

Acrocercops cyma Bradley

Acrocercops cyma Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19) : 106.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂.
DISTRIBUTION. Solomon Is. (Rennell I.).

Acrocercops sp.

GUADALCANAL : Honiara, 4–10.x, 1 ex.
TULAGI : 24.ix, 1 ex.
Both specimens lack the abdomen. They represent a species related to *A. phaeodeta* Meyrick, which occurs in Samoa.

Liocrobyla saturata sp. n.

(Pl. 7, fig. 8)

♂ 9 mm. Labial palpus whitish-grey, second segment darker exteriorly, terminal segment suffused with fuscous towards apex. Head with front whitish suffused with cream-buff ; crown, thorax and tegula mouse grey. Antenna (damaged) mouse grey above, whitish dotted with fuscous anteriorly ; scape mouse grey above, whitish anteriorly. Fore wing mouse grey, two inwardly-oblique, parallel, fuscous stripes from costa near middle, confluent at costa, a weak ochraceous-buff admixture in both stripes most evident in the outer (second) stripe ; a very outwardly-oblique, narrow, somewhat metallic plumbeous streak from middle of costa cutting diagonally across second stripe and reaching to middle of disc and ending in a sharply inturned hook ; a pair of similar, short, thin, parallel lines in tornal area ; a similar outwardly-oblique dash on costa at 4/5 and another, shorter, dash immediately below ; area between and surrounding these streaks and dashes fuscous strongly overlaid with ochraceous-buff ; a very thin, inwardly-oblique, shining plumbeous line from before apex to tornus interrupted at middle by a thick cream-buff dash broadly edged distally with shining plumbeous and by a heavy black dash above and another slightly narrower and longer dash below, both edged with ochraceous-buff ; cilia cream-buff basally, apical half fuscous, with an admixture of ochraceous-buff. Hind wing mouse grey ; cilia matching. Legs mouse grey, hind tibia striped with white exteriorly.

Male genitalia : Pl. 18, fig. 11.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂, holotype.

This species has similar coloration to *L. paraschista* Meyrick but differs basically in fore wing pattern ; the two species can be readily distinguished by the labial palpus which in *paraschista* is short and with a blackish subapical band on the second segment, and blackish medial and apical bands on the terminal segment. The present generic assignment is uncertain and is based principally on structure of the genitalia.

Parectopa sp.

GUADALCANAL : Honiara, 6–12.i, 1 ♂, abdomen missing.

Near the Samoan species *P. pyrelictis* Meyrick.

Timodora callicirrha Meyrick

Timodora callicirrha Meyrick, 1924, *Exot. Microlep.* **3** : 86.

GUADALCANAL : Honiara, 8–18.ix, 1 ex., 4–10.x, 2 ex.

DISTRIBUTION. Fiji.

Timodora sp.

GUADALCANAL : Honiara, 4–10.x, 1 ♂, abdomen missing.

Near *T. chrysochoa* Meyrick but smaller and without the conspicuous dot at the middle of the costa of the fore wing.

Phyllocnistis selenopa Meyrick

Phyllocnistis selenopa Meyrick, 1915, *Exot. Microlep.* **1** : 348.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.

This species is one of the smallest of the Lepidoptera. It was originally described from a specimen bred from leaf-mines on *Melia azedarach* (Meliaceae) in Ceylon. The type is in poor condition and without its abdomen, and the identification of the specimen from the Solomon Islands remains to be verified when more material is available.

LYONETIIDAE

Opostega leucoprepes sp. n.

(Pl. 7, fig. 9)

♂ 8 mm. Labial palpus, head, thorax, tegula and antennal eye-cap shining white ; shaft of antenna pale cream-buff, white-scaled towards base. Fore wing shining white, markings confined to apical third of wing ; a broad elongate capucine yellow marking from near inner margin at 2/3 extending longitudinally across the wing to termen and apex, this marking constricted at the middle in tornal area and connected at this point to a sickle-shaped, very distinct, capucine yellow mixed with dark brown line which arises from the costa at about 4/5, the half of the marking basad of the constriction is broadly edged with hair brown basally and along the inner margin of the wing ; a bold jet black dot at apex ; cilia light drab, mixed with hair brown along termen, tufted at apex and tipped with dark hair brown, a blackish basal dash immediately below apex. Hind wing and cilia light drab. Legs white, hind tibia clothed with cream-buff hairs dorsally and with tarsi barred with fuscous.

Male genitalia : Pl. 18, figs. 12, 13.

GUADALCANAL : Honiara, 4–10.x, 1 ♂, holotype, 8–18.ix, 2 ♂.

A distinctive species, perhaps nearest *O. orestias* Meyrick, from Queensland, which has similar coloration but has the yellow marking on the fore wing extending obliquely from the costa, and not along the inner margin.

Opostega sp.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ex., abdomen missing.

Similar to *O. argentella* Bradley, from Rennell I., but without the marking present on the inner margin of the fore wing in that species.

Bedellia somnulentella (Zeller)

Lyonetia somnulentella Zeller, 1847, *Isis von Oken*, **1847** : 894.
Bedellia orpheella Stainton, 1849, *Syst. Cat. Brit. Tineidae*, **1849** : 23.
Bedellia mnesileuca Meyrick, 1928, *Exot. Microlep.* **3** : 397. ***Syn. nov.***
Bedellia ipomoeae Bradley, 1953, *Proc. Hawaii. ent. Soc.* **15** : 114. ***Syn. nov.***

GUADALCANAL : Honiara, 4–10.x, 1 ♂.

The re-examination of type material in the British Museum (Natural History) has established the new synonymy given above.

As no original or subsequent type selection appears to have been made for the species *B. mnesileuca* Meyrick (*loc. cit.*) I select a lectotype. The specimen selected as lectotype is a male and carries a label with the following data, " Queensland, Duaringa, G.B./85 ". The genitalia are mounted on slide No. 5996. This specimen is from a series of ten of the original twenty syntypes in Meyrick's collection. When describing *mnesileuca*, Meyrick (*ibid.* p. 398) says, " I have hitherto recorded this as *somnulentella*, but now perceive it to be distinct ; *somnulentella*, which has a dark face, has not occurred authentically in Australia or New Zealand ". From this it would seem that the coloration of the head varies, as does the blackish irroration of the fore wing. The specimens from Fiji used for the description of *B. ipomoeae* Bradley (*loc. cit.*) are examples in which the coloration is pale compared with European *somnulentella*. No marked differences could be found in the genitalia of specimens from various localities in both hemispheres.

One of the original three syntypes of *B. somnulentella* (Zeller) (*loc. cit.*) is in the British Museum (Natural History) and is labelled with a museum type label, this label having been attached before the term lectotype was introduced into nomenclature. Re-examination has shown that it is a female, although described as a male by Zeller, and carries a label with the data " Syracuse, 12 Mai ". Genitalia slide No. 5965. I now designate this specimen lectotype.

DISTRIBUTION. Occurring on continents and oceanic islands in both hemispheres in habitats where *Convolvulus* and *Ipomoea* species are found, the larva making blotches in the leaves.

Bucculatrix sp.

GUADALCANAL : Honiara, 8–18.ix, 2 ♀.

A distinctive species almost wholly white and with only weak markings towards the apex of the fore wing. In the absence of a male I have refrained from naming this species.

Opogona sp.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♀.

A probably undescribed species, superficially resembling *O. fumiceps* (Felder) and *O. retractella* (Walker).

Opogona mendanai sp. n.

(Pl. 7, fig. 10)

♂♀ 9–10 mm. Labial palpus smoke grey, overlaid with iron grey exteriorly. Front of head (face) glossy smoke grey ; crown bister, scales appressed ; chaetosema prominent, situated on vertex between antennae. Thorax bister anteriorly, posterior third barium yellow ; patagium bister. Antenna cartridge buff, basal two or three segments fuscous-black ; scape dark fuscous. Fore wing coloration divided transversely at middle, the basal half barium yellow with a wedge-shaped dark fuscous marking at base of costa, distal half bister; a strong suffusion of blue iridescent scales immediately distad of medial line of demarcation which is directly vertical or slightly inwardly-oblique from costa; cilia hair brown. Hind wing fuscous; male with a large, conspicuous patch of specialized jet black scales in basal area, a lanceolate, thinly scaled area extending medially from basal patch nearly to apex, anterior (costal) margin of patch with fine, moderately dense, cream-buff scales, inner (dorsal) margin fringed with scales arranged in a serried, transverse formation in basal half; cilia in both sexes hair brown or drab. Legs smoke grey, infuscate anteriorly; tibiae clothed with long, fine, drab hairs above.

Male genitalia: Pl. 19, figs. 1, 2.

YSABEL: Tatamba, 2.x, 1 ♂, holotype.

GUADALCANAL: Honiara, 8–18.ix, 1 ♀, paratype.

Related to *O. semisulphurella* (Stainton), but readily distinguished from this and other species of the genus by the large patch of specialized black scales on the hind wing of the male.

Opogona sp.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♀.

Superficially similar to *O. citrolopha* Meyrick, and possibly a form of this species.

Opogona meeki sp. n.

(Pl. 7, fig. 11)

♀ 10–12 mm. Labial palpus shining white, a thick, dark fuscous line along upper margin of basal 3/5 of second segment, exterior of terminal segment shaded with cream-buff. Front of head cartridge buff; fore part of crown (between antennae), antenna and scape shining white, remainder of crown clothed with slender, erect, bister scales. Thorax and tegula chaetura drab. Fore wing chaetura drab with a bronzy patina; anterior edge of costa and cilia around apex and along termen cream-buff; cilia beneath tornus dark grey. Hind wing brassy-grey; cilia dark grey. Legs cartridge buff, hind leg and long hair on hind tibia suffused greyish.

Female genitalia: Pl. 19, figs. 3–5.

GUADALCANAL: Honiara, 8–18.ix, 3 ♀, including holotype.

Superficially similar to the Fijian species *O. amblyxena* Meyrick, but slightly larger and without the fine white line present a little before the apex of the fore wing in that species.

Opogona guppyi sp. n.

(Pl. 7, fig. 12)

♂♀ 9–10 mm. Labial palpus cartridge buff, upper margin of second segment marked with dark fuscous to near apex. Front of head cartridge buff; crown clothed with slender, erect, bister scales. Thorax and tegula drab. Antenna cartridge buff becoming white towards base; scape white. Fore wing wholly drab, somewhat paler towards base; cilia concolorous. Hind wing brassy-grey; cilia pale drab. Legs cartridge buff suffused with fuscous.

Male genitalia (Pl. 19, figs. 6, 7): Uncus bilobed.

Female genitalia (Pl. 19, figs. 8–10): Signum two-pronged.

GUADALCANAL: Honiara, 4–10.x, 1 ♂, holotype, 1 ♀; 8.ix, 2 ♀, including allotype.

Related to the previous species, *O. meeki* Bradley, but smaller and differing superficially in not having the anterior edge of the costa and the cilia around the apex and along the termen of the fore wing cream-buff.

Ereunetis leucophaeta Bradley

Ereunetis leucophaeta Bradley, 1957, *Nat. Hist. Rennell I., Brit. Solomon Is.* **2** (19): 108.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂; 4–10.x, 1 ♂.

DISTRIBUTION. Solomon Is. (Rennell I.).

Decadarchis flavistriata (Walsingham)

Ereunetis flavistriata Walsingham, 1907, *Fauna Hawaiiensis,* **1** pt. 5: 716, pl. 25, fig. 18.
Decadarchis euophthalma Meyrick, 1924, *Exot. Microlep.* **3**: 83. ***Syn. nov.***

ONTONG JAVA: Leuaniua, 29.ix, 1 ♀.

DISTRIBUTION. Hawaiian Is., Solomon Is., Java, Malaya, Fiji, Marquesas, New Hebrides and Kermadec Is.

The above new synonymy has been established following an examination of the relevant type material in the British Museum (Natural History).

Decadarchis emphera sp. n.

(Pl. 7, fig. 13)

♂ 12–13 mm. Labial palpus cartridge buff or cream-buff with an admixture of white scales, basal segment marked with dark fuscous exteriorly, second segment with a broad transverse dark fuscous marking extending across tuft, bristles dark fuscous, terminal segment with a similar much narrower marking at middle extending into tuft. Head white mixed with cartridge buff or cream-buff. Thorax and tegula white suffused and mixed with cartridge buff and cream-buff, base of tegula marked with dark fuscous. Antenna cream-buff; scape cartridge buff sprinkled with cream-buff scales. Fore wing white, markings blackish with margins somewhat diffuse and irregularly suffused with cream-buff; a short oblique streak from base of costa terminating a little before a thicker, curved, streak arising from costa at 1/3 and curving inward to middle of disc where it is interrupted and then forks, one prong going direct to apex and widening near apical margin and extending into cilia, the other shorter, broader, prong going to costa at about 5/6; a small dot on costa a little beyond middle; cilia white mixed with cream-buff; a thin, dark fuscous basal line around apex and along termen; speckled with dark fuscous near apices before apex and along termen, and medially at tornus. Hind wing light grey, margins darker; cilia concolorous; an expansible, cream-buff, marginal hair-pencil from before middle of costa reaching to about 4/5; a small, dense, expansible tuft in a shallow groove on upper surface near base of costa, concealed by the anal lobe of the fore wing when the wings are spread.

Male genitalia: Pl. 19, figs. 11, 12.

GUADALCANAL: Tapenanje, 10–23.xii, 1 ♂, holotype; Honiara, 4–10.x, 1 ♂.

TULAGI: 24.ix, 3 ♂.

Apparently closely related to *D. dissipta* Meyrick, from Fiji, and having basically similar wing maculation, but differing in male genitalia: the valva and juxta being considerably broader than in *dissipta*. Also closely related and superficially similar to *D. gephyrias* Meyrick, from Ceylon, but differing in the male genitalia in having the saccus much narrower.

Decadarchis discreta Meyrick

Decadarchis discreta Meyrick, 1910, *Trans. ent. Soc. Lond.* **1910**: 473.

GUADALCANAL: Honiara, 8–18.ix, 6 ♀, 4–10.x, 1 ♂, 1 ♀, 6–12.i, 1 ♂; Tapenanje, 10–23.xii, 7 ♂, 1 ♀; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

YSABEL: Tatamba, 2.x, 1 ♀.

DISTRIBUTION: Solomon Is. and Kei Is.

Decadarchis platyrrhyncha Meyrick

Decadarchis platyrrhyncha Meyrick, 1928, *Exot. Microlep.* **3**: 402.

GUADALCANAL: Honiara, 8–18.ix, 1 ♂.

DISTRIBUTION: New Hebrides.

Decadarchis inculta Meyrick

Decadarchis inculta Meyrick, *Insects of Samoa,* **3**, Lep. fasc. 2: 111

GUADALCANAL: Honiara, 8–18.ix, 4 ex., 6–12.i, 1 ex.; Tapenanje, 10–23.xii, 1 ex.

YSABEL: Tatamba, 2.x, 2 ex.

DISTRIBUTION. Samoa.

Decadarchis sp.

ONTONG JAVA: Avaha, 30.ix, 3 ex.

Very near to *D. inculta* Meyrick superficially and in structure of male genitalia.

Decadarchis carpophthora Meyrick

Decadarchis carpophthora Meyrick, 1932, *Exot. Microlep.* **4**: 232.

GUADALCANAL: Honiara, 8–18.ix, 3 ♂, 2 ♀, 4–10.x, 2 ♂, 1 ♀; Tapenanje, 10–23.xii, 2 ♂.

DISTRIBUTION: Solomon Is.; the larva feeding in very young coconuts,

Decadarchis sp.

GUADALCANAL : Honiara, 8–18.ix, 3 ex., 4–10.x, 1 ♂ ; Tapenanje, 10–23.xii, 1 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

This material is too worn for descriptive purposes but apparently represents an undescribed species related to *D. carpophthora* Meyrick.

Decadarchis hyperacma Meyrick

Decadarchis hyperacma Meyrick, 1915, *Exot. Microlep.* **1** : 367.

GUADALCANAL : Tapenanje, 10–23.xii, 1 ♂.

DISTRIBUTION : Australia (Queensland).

Decadarchis semifusca sp. n.

(Pl. 7, fig. 14)

♂ 15–16 mm. Labial palpus cartridge buff, basal segment and second segment except apex suffused with fuscous exteriorly, bristles dark fuscous. Head rough-haired, cartridge buff. Thorax broadly cartridge buff medially, fuscous laterally ; tegula fuscous. Antenna and scape cartridge buff, antenna slightly darker. Fore wing cartridge buff, a broad, somewhat diffuse, fuscous submedian streak from base to termen near tornus, heaviest near base and having inner (proximal) margin moderately well-defined and, when the wings are folded over the abdomen, abutting on to the fuscous area of the thorax ; anterior (costal) area of wing in some examples suffused with light fuscous ; cilia concolorous, a short, fuscous basal line around tornus. Hind wing pale cartridge buff ; cilia concolorous.

Male genitalia : Pl. 19, figs. 13, 14.

ONTONG JAVA : Leuaniua, 29.ix, 9 ♂, including holotype ; Avaha, 30.ix, 4 ♂.

Superficially this species is nearest to *D. psammaula* Meyrick, described from Tahiti, but is distinguished by its darker and more sombre coloration.

TINEIDAE

Monopis monachella (Hübner)

Tinea monachella Hübner, 1796, *Samml. Europ. Schmett.* **8** : pl. 21, fig. 143.

GUADALCANAL : Honiara, 4–10.x, 2 ♂ ; Ilu Farm, 26.xii.53–4.i.54, 2 ♂.

DISTRIBUTION. An almost cosmopolitan species, mainly in warm regions, the larva feeding on dried skins, in birds' nests, refuse, etc.

Spatularia mimosae (Stainton)

Laverna ? mimosae Stainton, 1859, *Trans. ent. Soc. Lond.* **5** : 126.
Ereunetis ? semivora Walsingham, 1899, *Indian Mus. Notes*, **4** : 107.
Pylaetis ophionota Meyrick, 1907, *J. Bombay nat. Hist. Soc.* **18** : 752.
Spatularia fuligineella Deventer, 1904, *Tijdschr. Ent.* **47** : 1.

GUADALCANAL : Honiara, 4–10.x, 1 ♀.

DISTRIBUTION. Indo-Malayan region : larva in pods of mimosa (*Acacia*) and various other trees.

Tinea chlorospora Meyrick

Tinea chlorospora Meyrick, 1924, *Exot. Microlep.* **3** : 71.

GUADALCANAL : Honiara, 8–18.ix, 17 ex., 4–10.x, 7 ex.; Tapenanje, 10–23.xii, 1 ex.

NEW HEBRIDES : LUGANVILLE, Santo, 3.ix, 1 ♂.

DISTRIBUTION. Fiji.

Tinea nesocharis Meyrick

Tinea nesocharis Meyrick, 1928, *Exot. Microlep.* **3** : 427.

GUADALCANAL : Honiara, 8–18.ix, 5 ex., 4–10.x, 5 ex.; Tapenanje, 10–23.xii, 1 ♂, 1 ♀ ; Ilu Farm, 26.xii.53–4.i.54, 1 ♂.

DISTRIBUTION. Solomon Is. and Bismarck Archipelago.

Tinea despecta Meyrick

Tinea despecta Meyrick, 1919, *Exot. Microlep.* **2** : 274.

GUADALCANAL : Honiara, 8–18.ix, 1 ♂.

YSABEL : Tatamba, 2.x, 1 ♀.

ONTONG JAVA : Avaha, 30.ix, 2 ♂.

DISTRIBUTION. Widespread in the Indo-Australian region and in South America (British Guiana, Colombia, Ecuador and Bermuda).

Cythaula inophora Meyrick

Cythaula inophora Meyrick, 1919, *Exot. Microlep.* **2** : 254.

GUADALCANAL : Ilu Farm, 26.xii.53–4.i.54, 1 ♀.

DISTRIBUTION. New Guinea.

Gerontha captiosella Walker

Gerontha captiosella Walker, 1864, *List. Lep. Ins. B.M.* **29** : 782.

GUADALCANAL : Honiara, 8–18.ix, 3 ♂, 4–10.x, 1 ♂, 1 ♀.

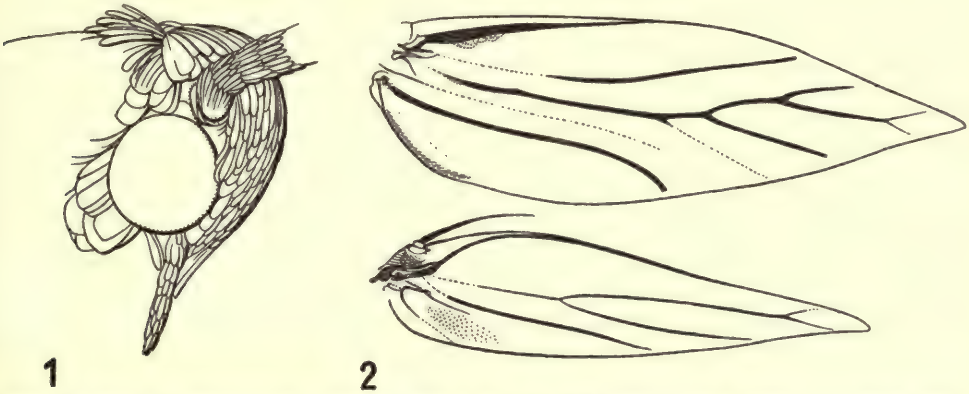
DISTRIBUTION. Occurring throughout the Indo-Australian region.

INCURVARIIDAE

Ischnocanaba gen. nov.

(Text-figs. 1, 2)

Labial palpus moderate, straight, drooping, slender, clothed with short appressed scales, without bristles; terminal segment 1/2 or longer, slightly rough-scaled at apex. Maxillary palpus not visible. Tongue moderately developed. Head with crown clothed in loosely appressed, broad-tipped scales fringing base of antenna; face receding, badly worn in specimen examined but apparently smooth-scaled. Eye moderate, round. Ocellus absent. Antenna implanted anterior to eye, about 1/2; scape small, smooth, cylindrical, not thickened, without pecten; flagellum (male) slightly compressed laterally towards base, clothed with slender, appressed scales throughout, producing a slight serrulation, apex roughened or tufted. Posterior tibia with closely appressed scales, inner spur of first pair very long and reaching beyond middle, inner spur of second pair almost as long. Fore and hind wings with greatly reduced or degraded venation. Fore wing with apex pointed, vein 1b simple, 1c represented by a fold, 2 and 3 coincident and very weak, 5 absent or coincident with 4, 6 and 7 long stalked and going to termen and apex respectively, 8 connate with 6 and 7, 9 absent, 10 present and strongly developed, 11 absent, 12 present. Hind wing lanceolate, vein 1a short and weak, 1b absent, 1c present and strongly developed, discocellular veins absent or very weak, 2 and 3 probably coincident and arising from angle of cell, 4 and 5 absent, 6 and 7 coincident to near apex, 6 to termen, 7 to apex, 8 moderately strong and very short, frenulum strongly developed.



FIGS. 1 and 2. *Ischnocanaba euryzona* gen. n. sp. n. (1) Lateral view of head to show labial palpus. (2) Venation of fore and hind wings (del. Arthur Smith).

Male genitalia (Pl. 15, fig. 15): Uncus reduced to two or three simple points or papillae. Valva simple, costa separate, without specialized comb; sacculus in the form of a spined knob or pad. Vinculum very large and strongly sclerotized.

Type species of genus : *Ischnocanaba euryzona* sp. n.

This genus is at once distinguished from other known genera of the Incurvariidae by the greatly reduced or degraded wing venation. The comparatively smooth scaling of the head is also exceptional for this family. The male genitalia show the basic incurvariid morphological characters but lack specialized spining on the valva.

The systematic position of this genus in the Incurvariidae is uncertain and it is tentatively placed between the genera *Phylloproria* and *Lampronia,* to which it bears closest superficial resemblance. So far as is known the family has not previously been known from the Solomon Islands.

Ischnocanaba euryzona sp. n.

(Pl. 7, fig. 15)

♂ 9 mm. Labial palpus drab. Head with crown clothed with broad-tipped, loosely appressed, smooth, somewhat shining drab scales ; face worn in specimen examined but apparently having similar coloration. Thorax dull purplish-black ; tegula drab, overlaid at base and to near outer margin with dull purplish-black. Fore wing drab, heavily irrorate with dark mummy brown ; a moderately broad, inwardly-oblique, silvery white fascia, with weak bronzy reflections, from a little beyond middle of costa, inner edge straight, outer edge incurved before inner margin (dorsum) ; basal area of wing similarly coloured, and a small pre-apical dash ; cilia dark hair brown along dorsum and costa, whitish around apex and irrorate with dark mummy brown. Hind wing fuscous ; cilia dark hair brown. Legs drab, banded with dark mummy brown.

Male genitalia : Pl. 19, fig. 15 (aedeagus missing).

Guadalcanal : Honiara, 8–18.ix, 1 ♂, holotype.

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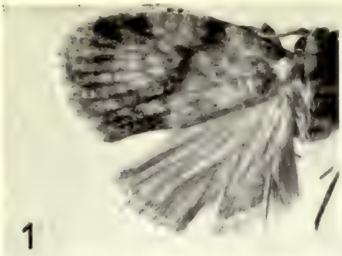
PLATE 5

		Wing expanse of species (mm.)
Fig. 1.	*Adoxophyes aurantiana* sp. n., holotype ♂	♂ 12–16, ♀ 17–20
Fig. 2.	*Olethreutes empherana* sp. n., allotype ♀	17–18
Fig. 3.	*Statherotis bicolorana* sp. n., holotype ♀	18
Fig. 4.	*Laspeyresia plumbosana* sp. n., holotype ♂	7–9
Fig. 5.	*Grapholita pagenstecheri* sp. n., holotype ♂	10
Fig. 6.	*Pityocona probleta* sp. n., holotype ♂	10–11
Fig. 7.	*Limenarchis pullata* sp. n., holotype ♂ (right wings, image reversed)	16–17
Fig. 8.	*Thyrsostoma longipalpis* sp. n., holotype ♂	12
Fig. 9.	*Thiotricha angelica* sp. n., holotype ♂	10–11
Fig. 10.	*Thiotricha tethela* sp. n., holotype ♀	9–10
Fig. 11.	*Thiotricha eremita* sp. n., holotype ♀	13
Fig. 12.	*Thiotricha melanacma* sp. n., holotype ♂	8
Fig. 13.	*Idiophantis pandata* sp. n., holotype ♂ (right wings, image reversed)	10
Fig. 14.	*Anarsia taurella* sp. n., holotype ♂	11
Fig. 15.	*Anarsia ulmarata* sp. n., holotype ♂	10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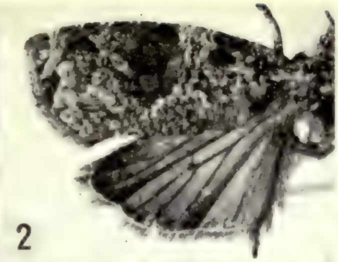
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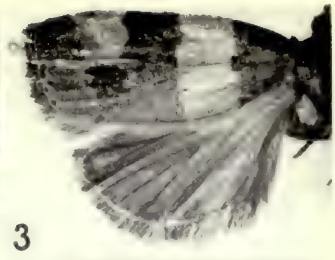
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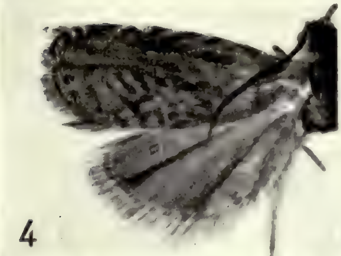
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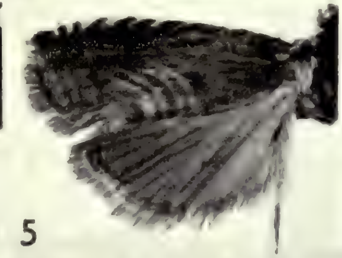
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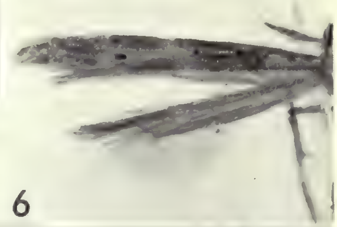
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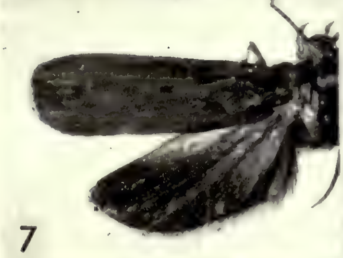
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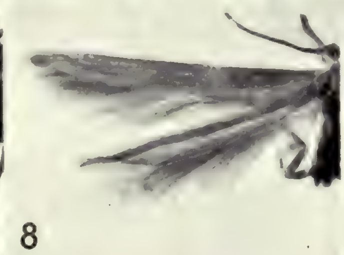
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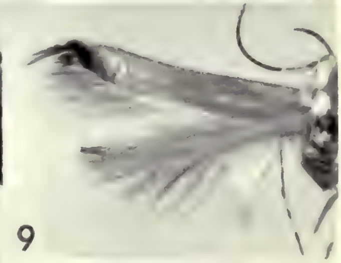
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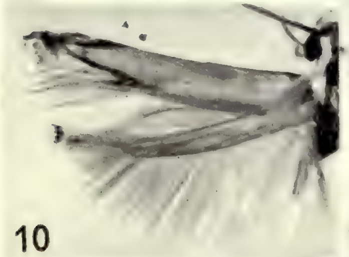
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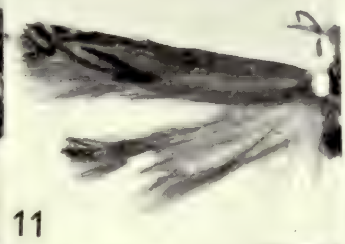
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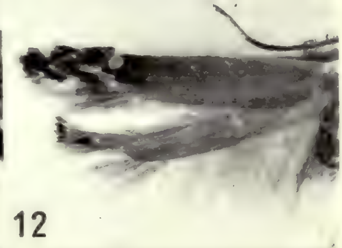
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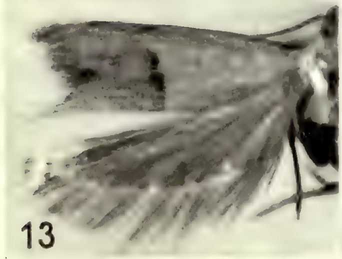
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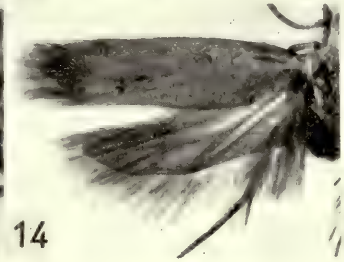
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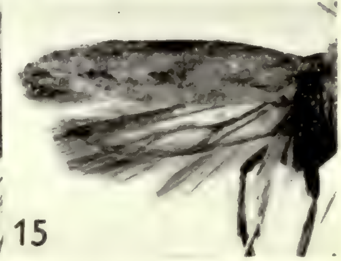
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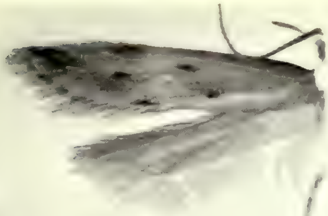
PLATE 6

		Wing expanse of species (mm.)
FIG. 1.	*Sitotroga psacasta* Meyrick, ♂	11–14
FIG. 2.	*Lecithocera palpella* sp. n., holotype ♂	14
FIG. 3.	*Pachnistis phaeoptila* sp. n., holotype ♂	15
FIG. 4.	*Apethistis brunnea* sp. n., holotype ♂	8–9
FIG. 5.	*Protobathra binotata* sp. n., holotype ♂	14–16
FIG. 6.	*Labdia torodoxa solomonensis* subsp. n., holotype ♂ (right wings, image reversed)	7–8
FIG. 7.	*Labdia ochrotypa* sp. n., holotype ♂ (right wings, image reversed)	7–8
FIG. 8.	*Labdia dolomella* sp. n., holotype ♂	7–8
FIG. 9.	*Labdia psarodes* sp. n., holotype ♂	9–10
FIG. 10.	*Labdia calypta* sp. n., holotype ♂	9–11
FIG. 11.	*Labdia isomerista* sp. n., holotype ♂	8
FIG. 12.	*Labdia aprepes* sp. n., holotype ♂	7–9
FIG. 13.	*Pyroderces phaeostigma* sp. n., paratype ♂	9–10
FIG. 14.	*Limnaecia argophylla* sp. n., holotype ♂	9
FIG. 15.	*Limnaecia perpusilla* sp. n., paratype ♂ (right wings, image reversed)	6–7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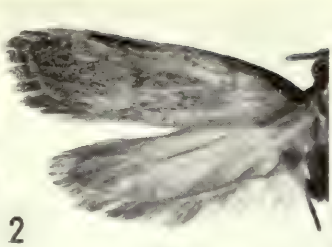
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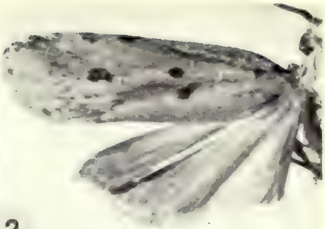
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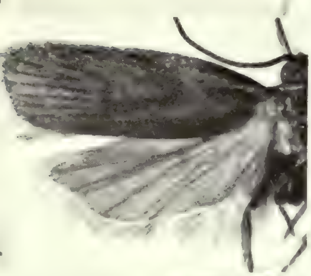
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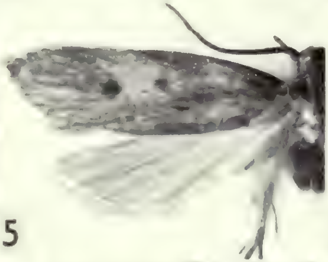
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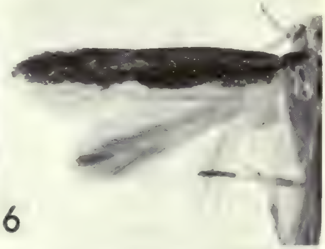
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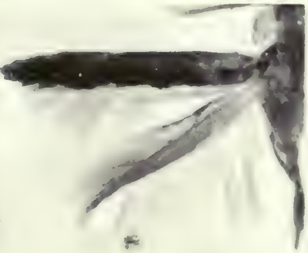
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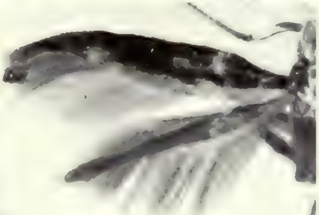
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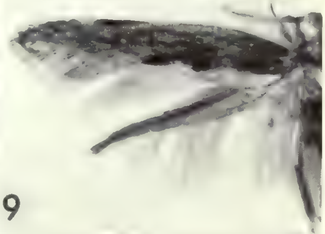
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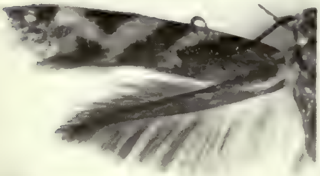
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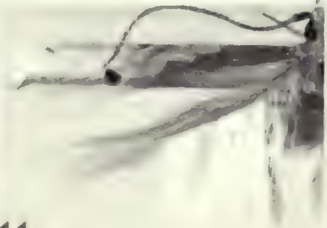
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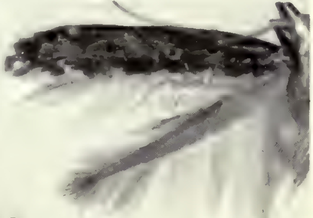
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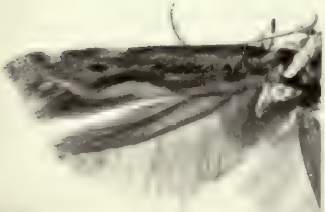
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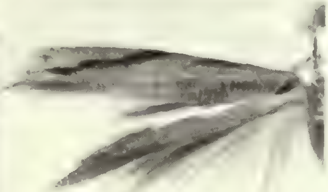
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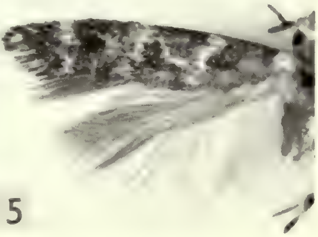
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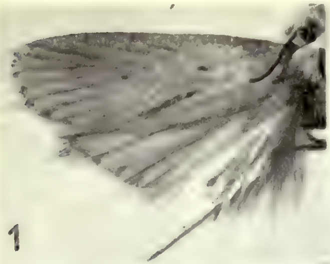
PLATE 7

		Wing expanse of species (mm.)
FIG. 1.	*Epimactis pulsatella* sp. n., holotype ♂	16
FIG. 2.	*Stathmopoda haplophanes* sp. n., holotype ♀	12
FIG. 3.	*Stathmopoda moschlosema* sp. n., holotype ♂	10–11
FIG. 4.	*Stathmopoda cornutella* sp. n., holotype ♂	12
FIG. 5.	*Thylacosceles pithanodes* sp. n., paratype ♂	8
FIG. 6.	*Choreutis diana* sp. n., holotype ♀	10–11
FIG. 7.	*Blastobasis sciota* sp. n., allotype ♀	11–16
FIG. 8.	*Liocrobyla saturata* sp. n., holotype ♂	9
FIG. 9.	*Opostega leucoprepes* sp. n., holotype ♂	8
FIG. 10.	*Opogona mendanai* sp. n., holotype ♂	9–10
FIG. 11.	*Opogona meeki* sp. n., holotype ♀	10–12
FIG. 12.	*Opogona guppyi* sp. n., paratype ♂ (right wings, image reversed ; hind wing folded)	9–10
FIG. 13.	*Decadarchis emphera* sp. n., holotype ♂	12–13
FIG. 14.	*Decadarchis semifusca* sp. n., paratype ♂	15–16
FIG. 15.	*Ischnocanaba euryzona* gen. n. sp. n., holotype ♂	9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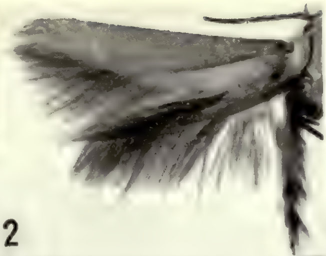
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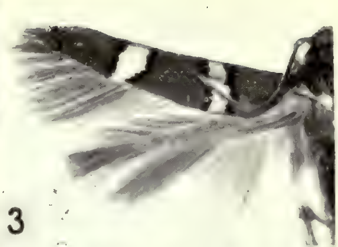
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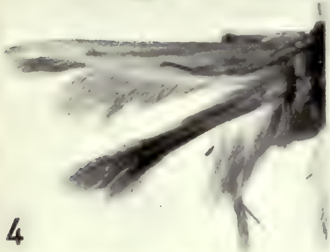
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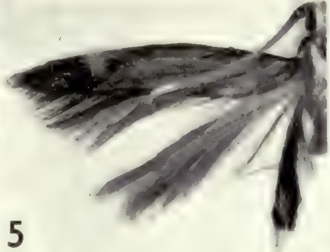
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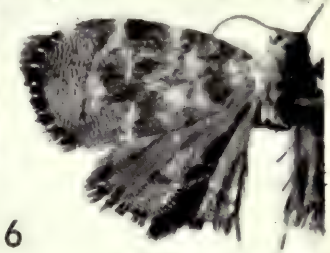
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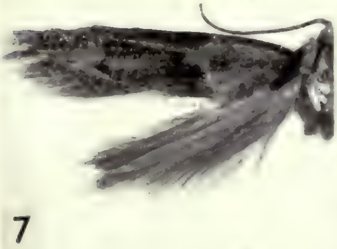
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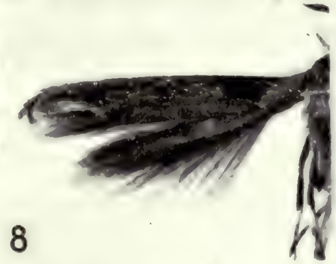
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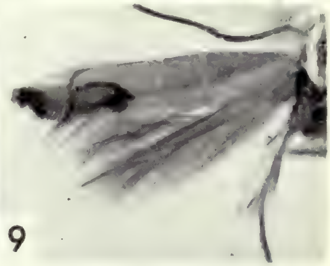
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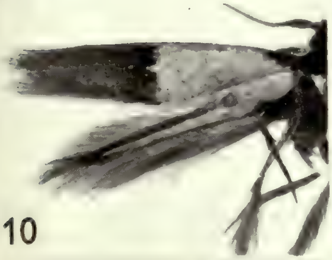
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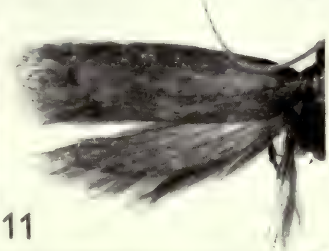
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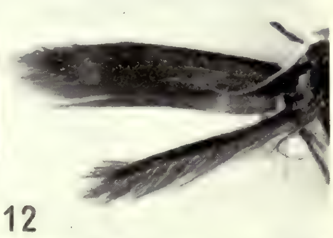
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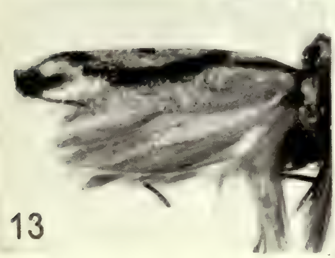
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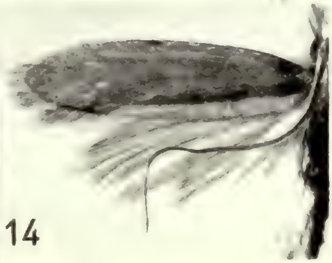
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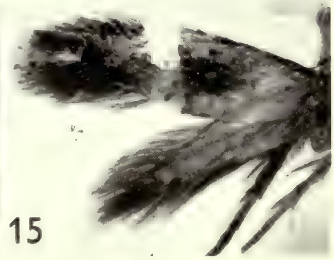
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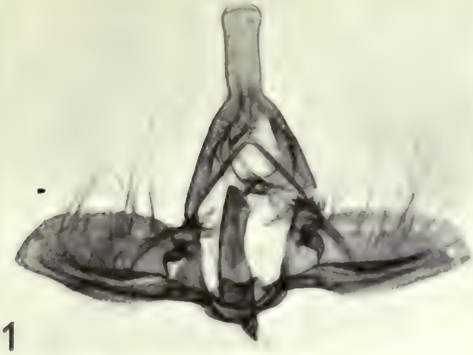
PLATE 8

FIG. 1. *Adoxophyes aurantiana* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5551).
FIG. 2. *Adoxophyes aurantiana* sp. n., ♀ genitalia, ostium (Slide 5029).
FIG. 3. *Ibidem*, ♀ genitalia.
FIG. 4. *Olethreutes empherana* sp. n., ♀ genitalia (Slide 4830).
FIG. 5. *Ibidem*, signum.
FIG. 6. *Ibidem*, ostium.
FIG. 7. *Olethreutes empherana* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 4859).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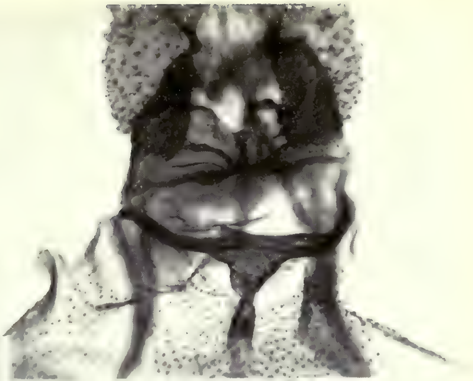
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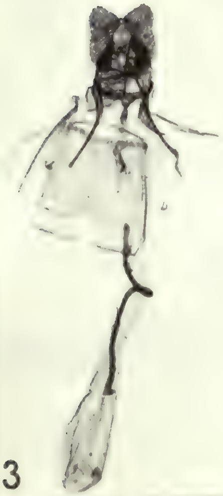
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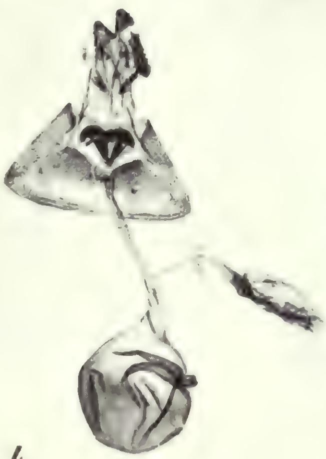
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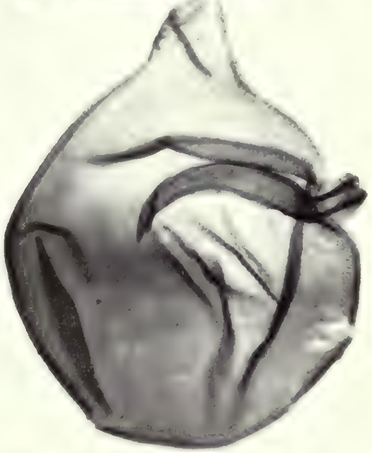
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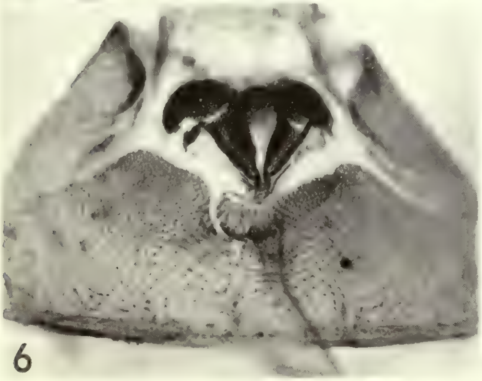
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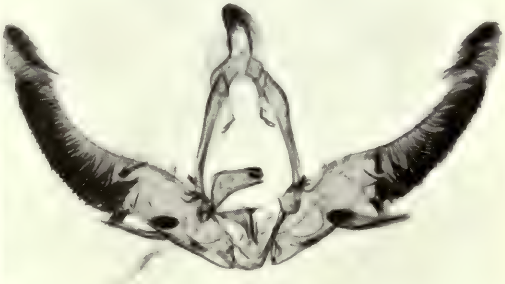
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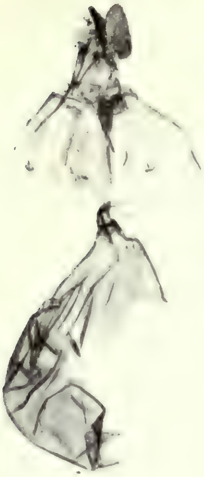
PLATE 9

Fig. 1. *Statherotis bicolorana* sp. n., ♀ genitalia (Slide 5498).
Fig. 2. *Ibidem*, signa.
Fig. 3. *Ibidem*, ostium.
Fig. 4. *Laspeyresia plumbosana* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5579).
Fig. 5. *Grapholita pagenstecheri* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5504).
Fig. 6. *Ibidem*, coremata on VIIIth abdominal segment of ♂.
Fig. 7. *Pityocona probleta* sp. n., ♂ genitalia (Slide 6005).
Fig. 8. *Ibidem*, aedeagus.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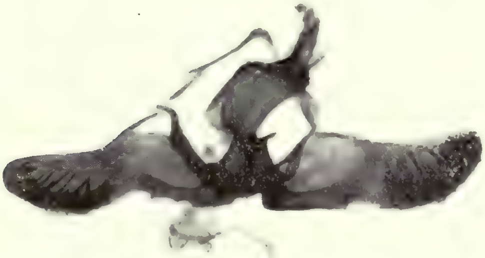
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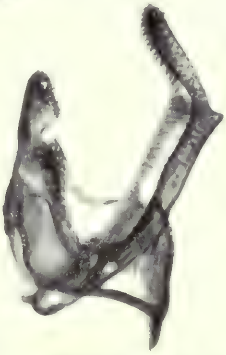
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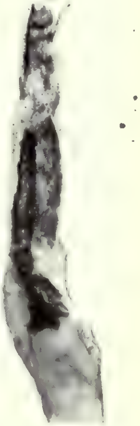
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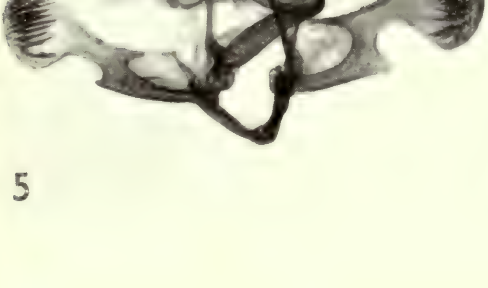
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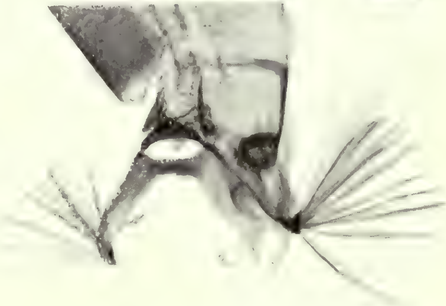
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PLATE 10

Fig. 1. *Pityocona probleta* sp. n., ♀ genitalia (Slide 6049).
Fig. 2. *Limnarchis pullata* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5096).
Fig. 3. *Thyrsostoma longipalpis* sp. n., ♂ genitalia (Slide 5610).
Fig. 4. *Ibidem*, aedeagus.
Fig. 5. *Thiotricha angelica* sp. n., ♂ genitalia (Slide 5107).
Fig. 6. *Ibidem*, aedeagus.
Fig. 7. *Thiotricha angelica* sp. n., ♀ genitalia (Slide 5630).
Fig. 8. *Ibidem*, ostium.
Fig. 9. *Ibidem*, signum.
Fig. 10. *Thiotricha tethela* sp. n., ♂ genitalia (Slide 5600).
Fig. 11. *Ibidem*, aedeagus (Slide 5094).
Fig. 12. *Ibidem*, sternite of VIIIth abdominal segment.
Fig. 13. *Thiotricha tethela* sp. n., ♀ genitalia (Slide 6059).
Fig. 14. *Ibidem*, ostium.
Fig. 15. *Ibidem*, signum.

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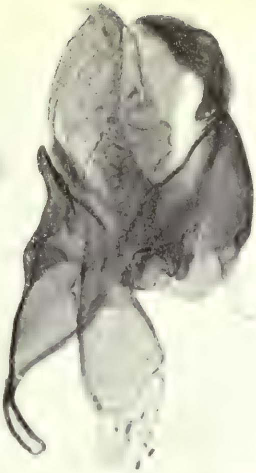
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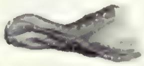
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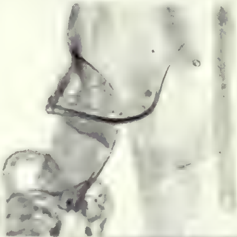
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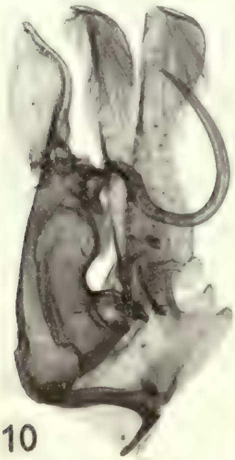
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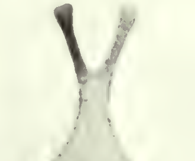
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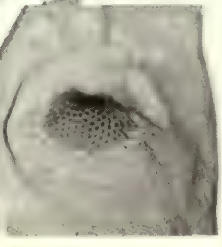
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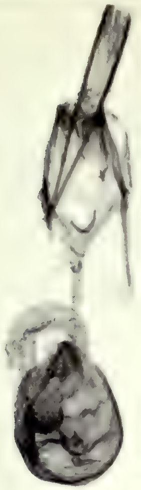
PLATE 11

Fig. 1. *Thiotricha eremita* sp. n., ♀ genitalia (Slide 5628).
Fig. 2. *Ibidem,* ostium.
Fig. 3. *Ibidem,* signum.
Fig. 4. *Thiotricha melanacma* sp. n., ♂ genitalia (Slide 5095).
Fig. 5. *Ibidem,* aedeagus.
Fig. 6. *Ibidem,* sternite of VIIIth abdominal segment.
Fig. 7. *Idiophantis pandata* sp. n., ♂ genitalia (tegumen and aedeagus removed) (Slide 5168),
Fig. 8. *Ibidem,* lateral view of tegumen showing uncus and gnathus.
Fig. 9. *Ibidem,* aedeagus.
Fig. 10. *Anarsia taurella* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5097).



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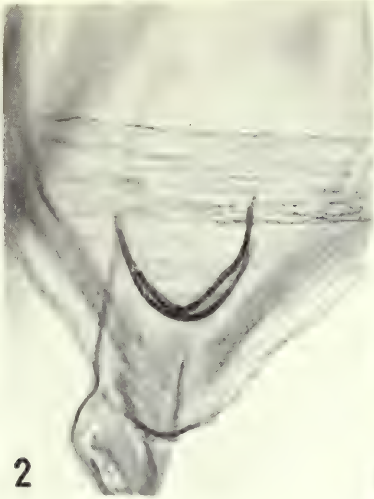

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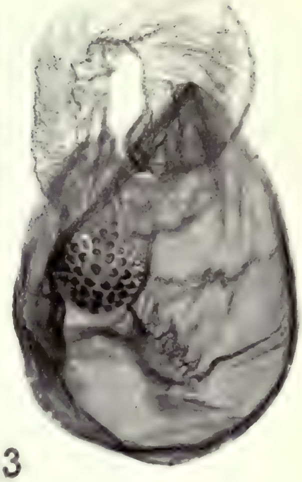

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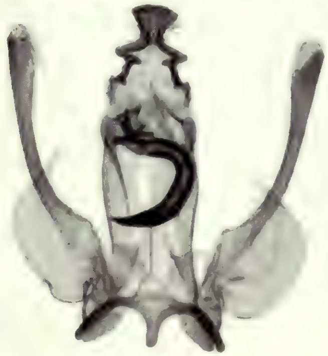

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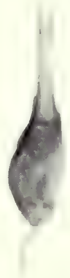

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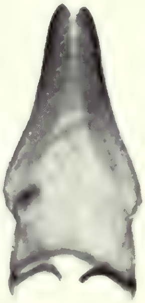

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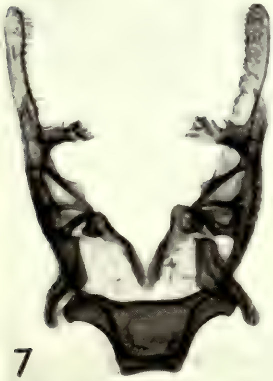

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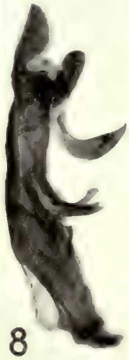

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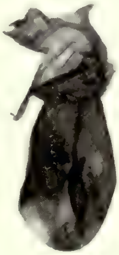

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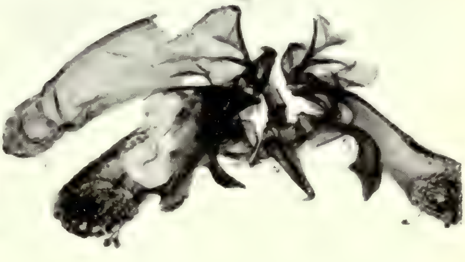

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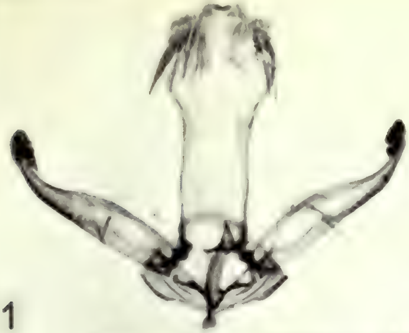
PLATE 12

FIG. 1. *Anarsia ulmarata* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5118).
FIG. 2. *Sitotroga psacasta* Meyrick, ♂ genitalia (Slide 5804).
FIG. 3. *Ibidem,* aedeagus.
FIG. 4. *Sitotroga psacasta* Meyrick, ♀ genitalia (Slide 4829).
FIG. 5. *Ibidem,* signa.
FIG. 6. *Ibidem,* ostium.
FIG. 7. *Lecithocera palpella* sp. n., ♂ genitalia (Slide 5103).
FIG. 8. *Ibidem,* aedeagus.
FIG. 9. *Pachnistis phaeoptila* sp. n., ♂ genitalia (Slide 5128).
FIG. 10. *Ibidem,* aedeagus.



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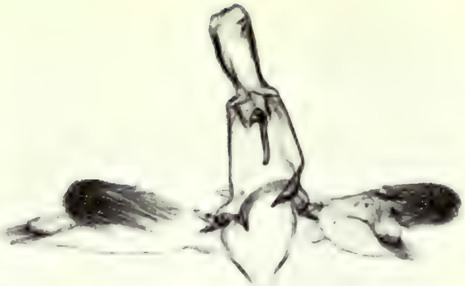

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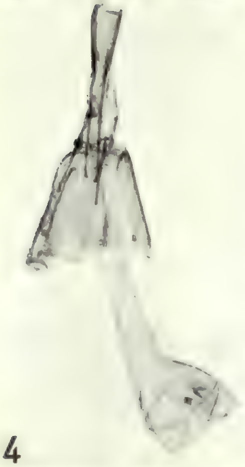

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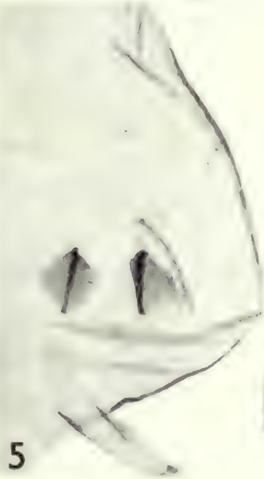

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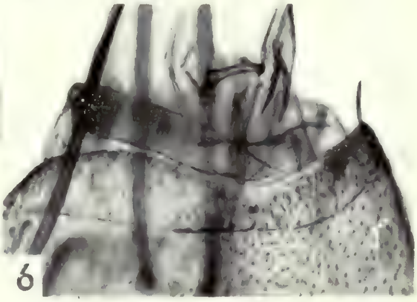

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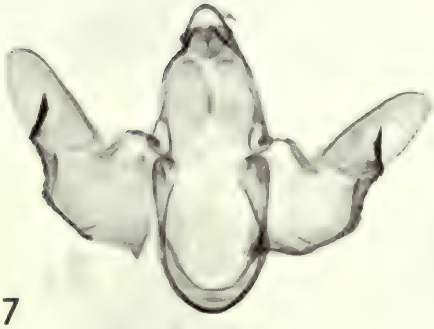

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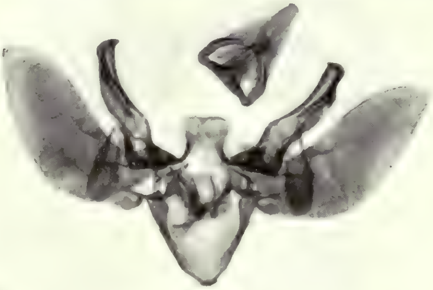

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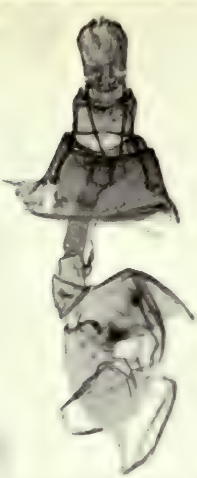
PLATE 13

FIG. 1. *Pachnistis phaeoptila* sp. n., ♀ genitalia (Slide 5052).
FIG. 2. *Ibidem*, ostium.
FIG. 3. *Ibidem*, signa.
FIG. 4. *Apethistis brunnea* sp. n., ♂ genitalia (Slide 5586).
FIG. 5. *Ibidem*, aedeagus.
FIG. 6. *Protobathra binotata* sp. n., ♂ genitalia (Slide 5099).
FIG. 7. *Ibidem*, aedeagus.
FIG. 8. *Protobathra binotata* sp. n., ♀ genitalia (Slide 5061).
FIG. 9. *Ibidem*, ostium.
FIG. 10. *Ibidem*, signa.
FIG. 11. *Labdia torodoxa solomonensis* subsp. n., ♂ genitalia, aedeagus *in situ* (Slide 4901).



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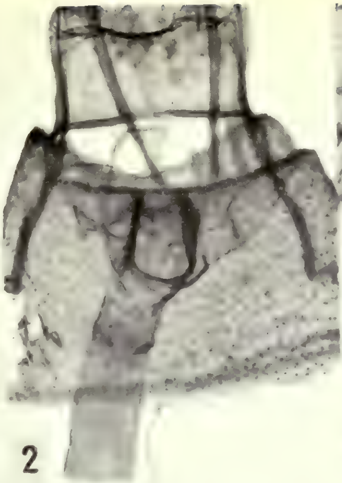

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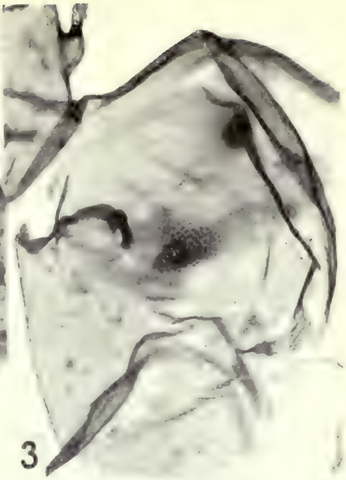

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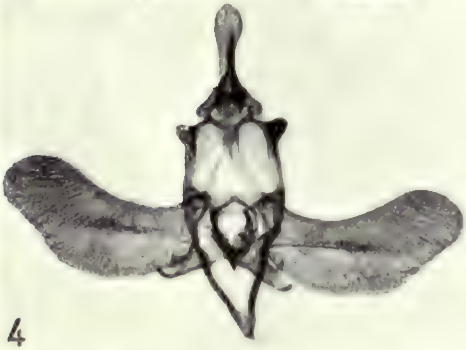

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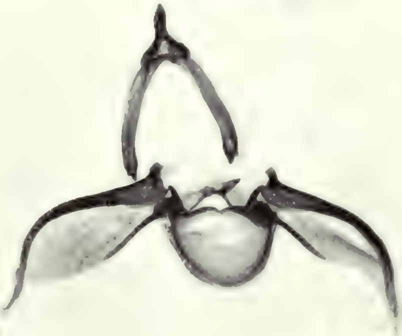

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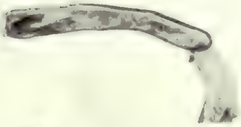

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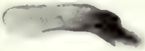

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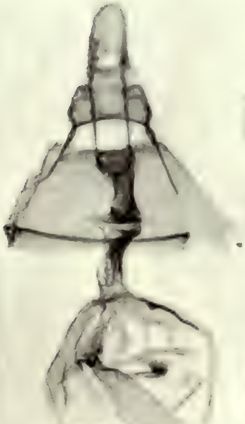

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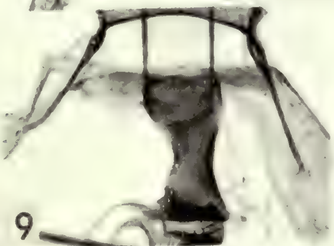

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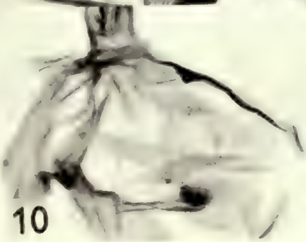

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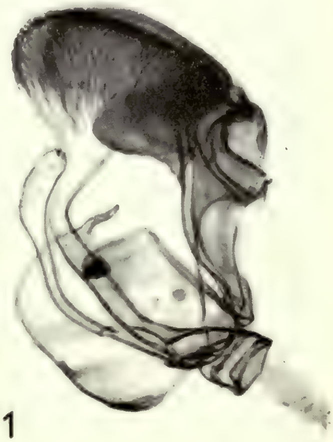

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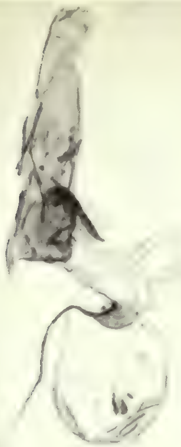
PLATE 14

FIG. 1. *Labdia torodoxa solomonensis* subsp. n., ♀ genitalia (Slide 5895).
FIG. 2. *Ibidem*, ostium.
FIG. 3. *Ibidem*, signum.
FIG. 4. *Labdia ochrotypa* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5605).
FIG. 5. *Labdia ochrotypa* sp. n., ♀ genitalia (Slide 5892).
FIG. 6. *Ibidem*, ostium.
FIG. 7. *Ibidem*, signa.
FIG. 8. *Labdia dolomella* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 3726).
FIG. 9. *Labdia dolomella* sp. n., ♀ genitalia (Slide 5887).
FIG. 10. *Ibidem*, ostium.
FIG. 11. *Ibidem*, signum.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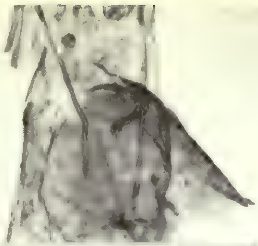
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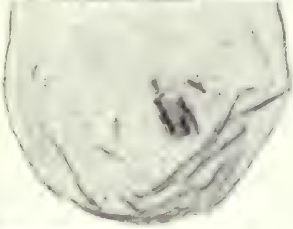
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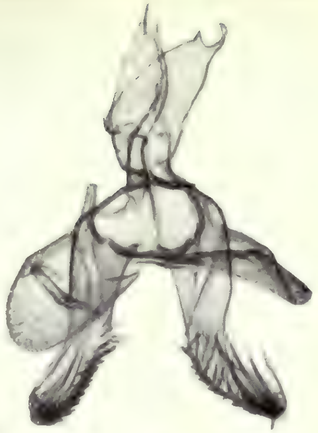
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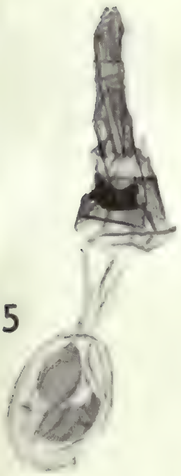
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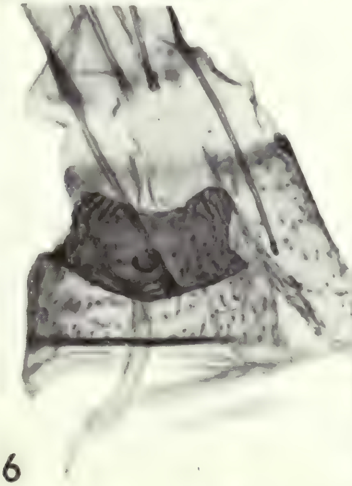
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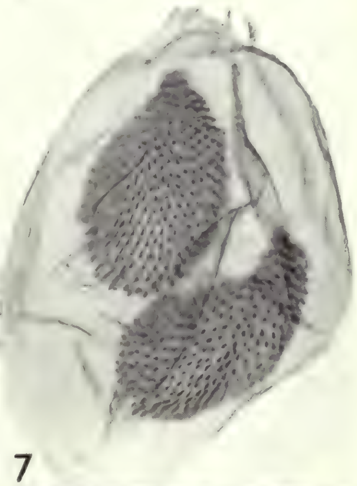
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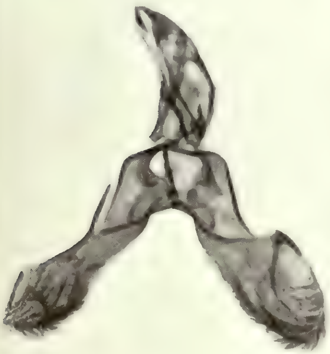
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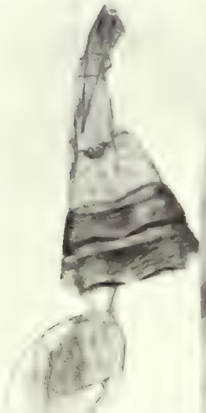
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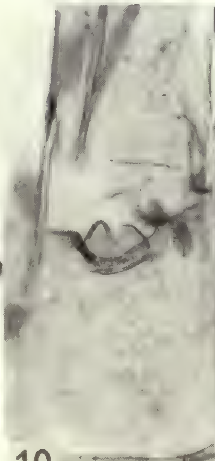
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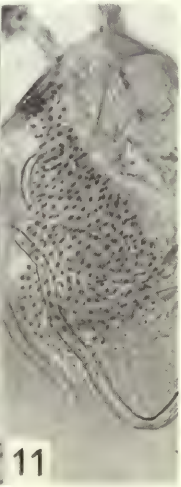
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PLATE 15

Fig. 1. *Labdia psarodes* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5937).

Fig. 2. *Labdia calypta* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5606).

Fig. 3. *Labdia calypta* sp. n., ♀ genitalia (Slide 5633).

Fig. 4. *Ibidem*, ostium.

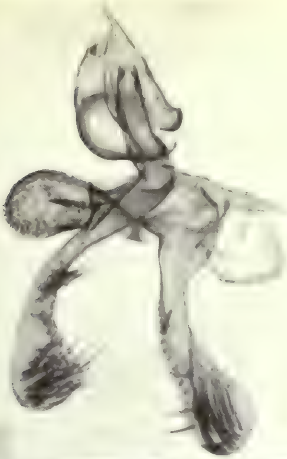
Fig. 5. *Labdia calypta* sp. n., ♂ adult, dorsal view showing thoracic hair-pencils entering the special pocket in the IIIrd abdominal segment.

Fig. 6. *Ibidem*, abdomen denuded to show the special cavity or pocket in the IIIrd abdominal segment.

Fig. 7. *Labdia isomerista* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5007).

Fig. 8. *Labdia isomerista* sp. n., abdomen of ♂ denuded to the dorsal cavity, containing specialized scales, in the IIIrd segment (viewed from below).

Fig. 9. *Labdia aprepes* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5938).



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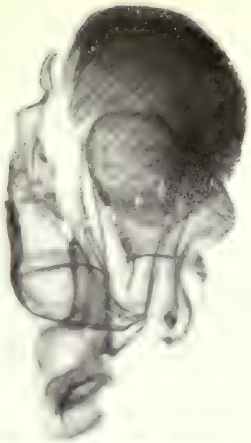

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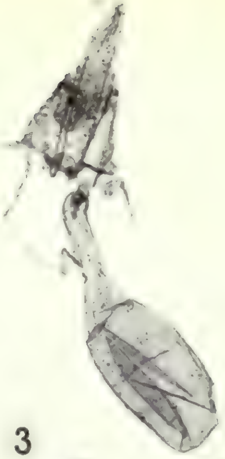

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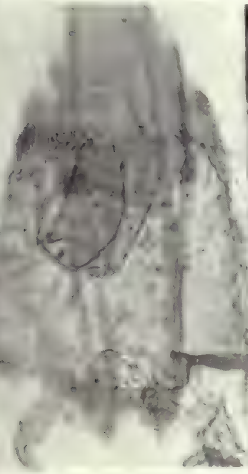

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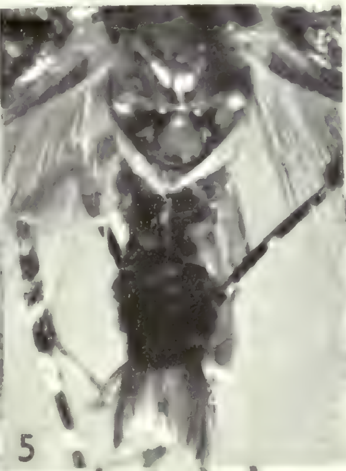

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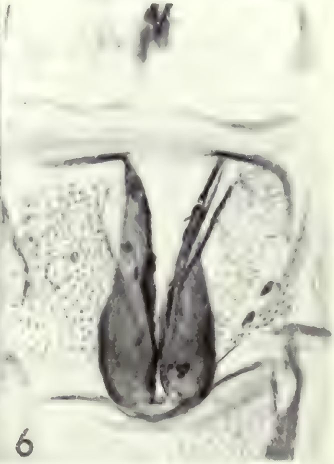

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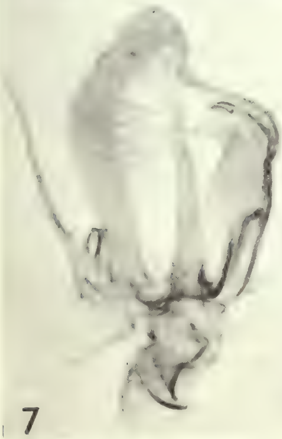

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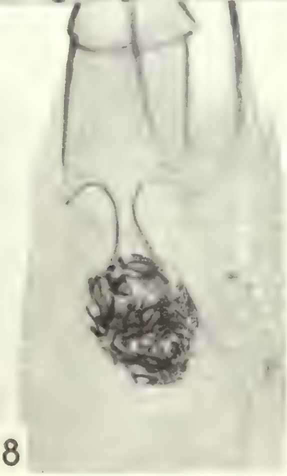

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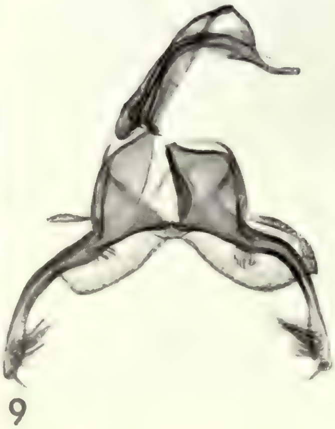

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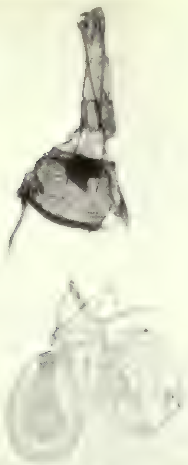
PLATE 16

FIG. 1. *Labdia aprepes* sp. n., ♀ genitalia (Slide 5890).
FIG. 2. *Ibidem*, ostium.
FIG. 3. *Ibidem*, signum.
FIG. 4. *Pyroderces phaeostigma* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5041).
FIG. 5. *Pyroderces phaeostigma* sp. n., ♀ genitalia (Slide 5868).
FIG. 6. *Ibidem*, ostium.
FIG. 7. *Limnaecia argophylla* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5047).
FIG. 8. *Limnaecia perpusilla* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5154).
FIG. 9. *Epimactis pulsatella* sp. n., ♂ genitalia (Slide 5162).
FIG. 10. *Ibidem*, aedeagus.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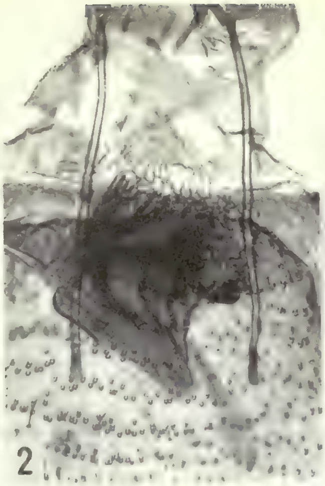
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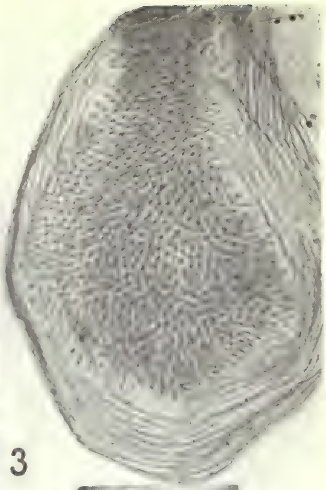
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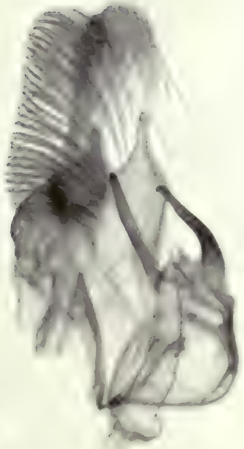
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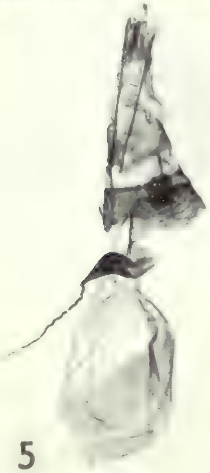
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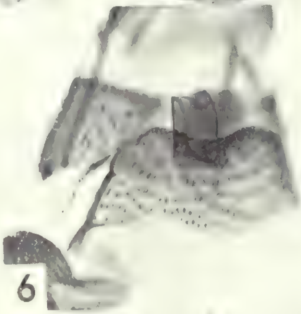
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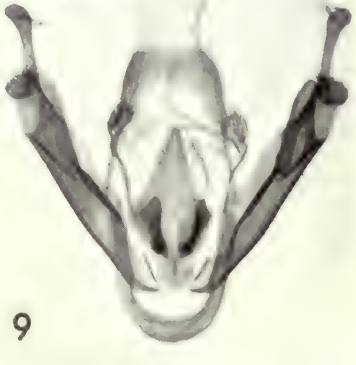
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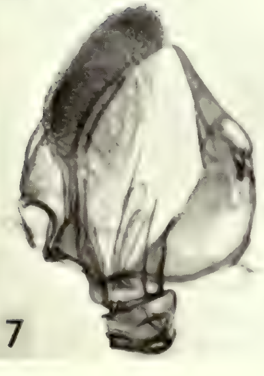
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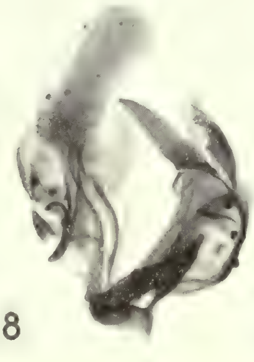
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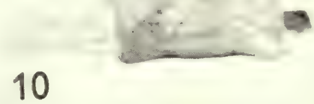
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PLATE 17

FIG. 1. *Stathmopoda haplophanes* sp. n., ♀ genitalia (Slide 5867).

FIG. 2. *Ibidem,* ostium.

FIG. 3. *Ibidem,* signa.

FIG. 4. *Stathmopoda moschlosema* sp. n., ♂ genitalia (Slide 6203).

FIG. 5. *Ibidem,* aedeagus.

FIG. 6. *Ibidem,* coremata on VIIIth abdominal segment of ♂.

FIG. 7. *Stathmopoda moschlosema* sp. n., ♀ genitalia (Slide 5840).

FIG. 8. *Ibidem,* ostium.

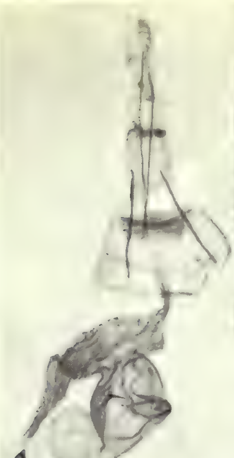
FIG. 9. *Ibidem,* signa.

FIG. 10. *Stathmopoda cornutella* sp. n., ♂ genitalia (Slide 5843).

FIG. 11. *Ibidem,* aedeagus.

FIG. 12. *Thylacosceles pithanodes* sp. n., ♂ genitalia, part of the tegumen detached, bearing the uncus and gnathus (Slide 5599).

FIG. 13. *Ibidem,* aedeagus.



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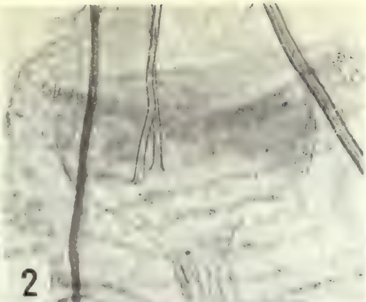

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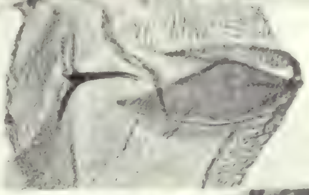

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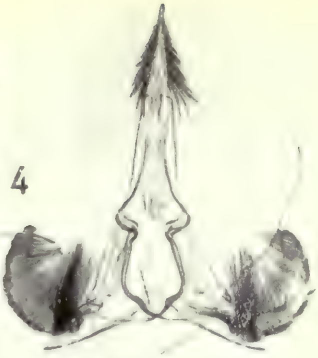

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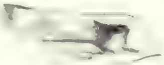

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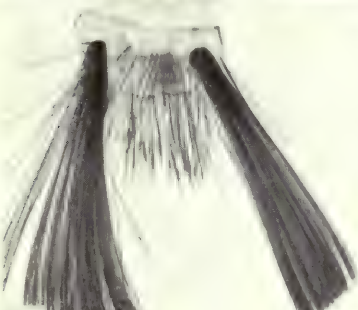

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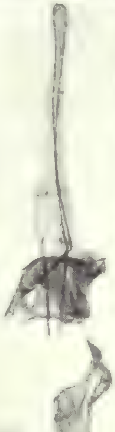

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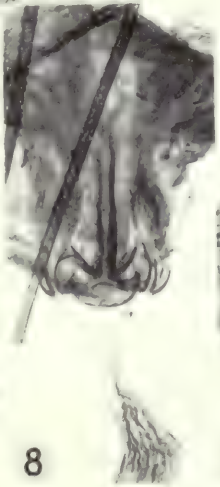

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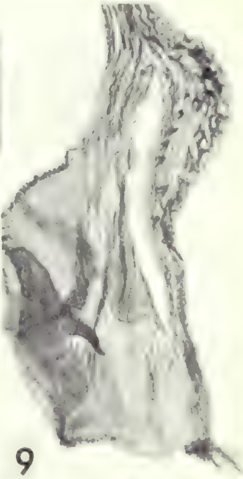

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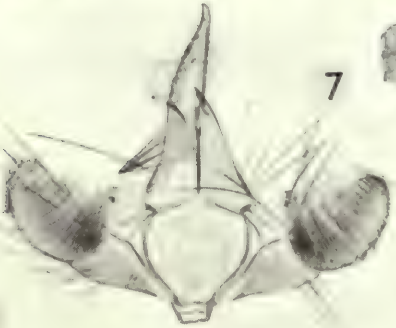

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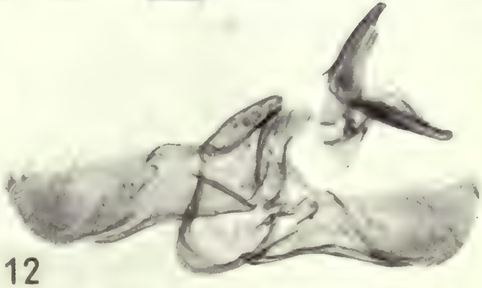

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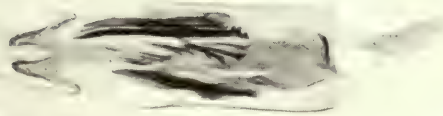

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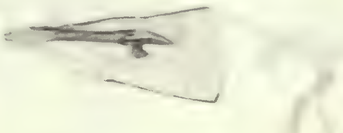

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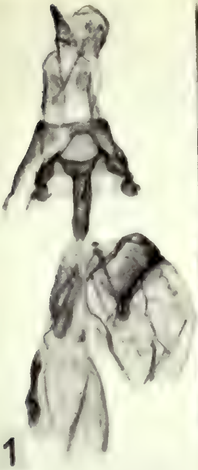
PLATE 18

Fig. 1. *Choreutis diana* sp. n., ♀ genitalia (Slide 5124).
Fig. 2. *Ibidem*, ostium.
Fig. 3. *Ibidem*, signum.
Fig. 4. *Choreutis diana* sp. n., ♂ genitalia (Slide 5163).
Fig. 5. *Ibidem*, aedeagus.
Fig. 6. *Blastobasis sciota* sp. n., ♂ genitalia (Slide 5899).
Fig. 7. *Ibidem*, aedeagus.
Fig. 8. *Blastobasis sciota* sp. n., ♀ genitalia (Slide 5877).
Fig. 9. *Ibidem*, ostium.
Fig. 10. *Ibidem*, signum.
Fig. 11. *Liocrobyla saturata* sp. n., ♂ genitalia, aedeagus *in situ* (Slide 5076).
Fig. 12. *Opostega leucoprepes* sp. n., ♂ genitalia (Slide 6002).
Fig. 13. *Ibidem*, aedeagus.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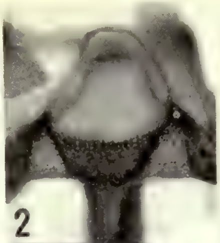
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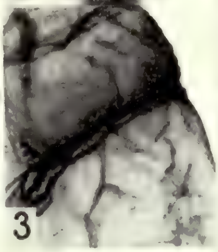
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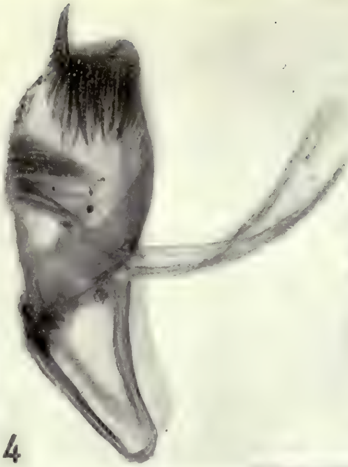
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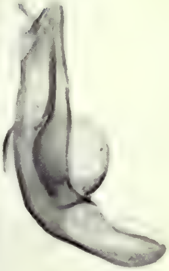
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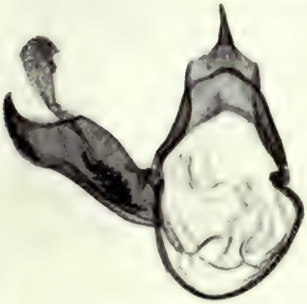
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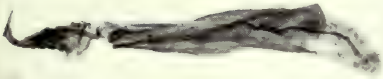
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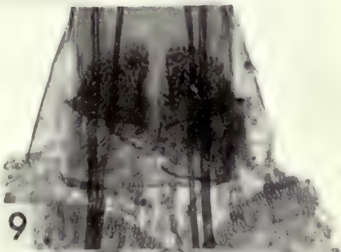
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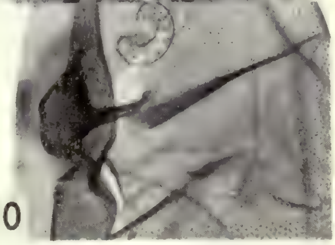
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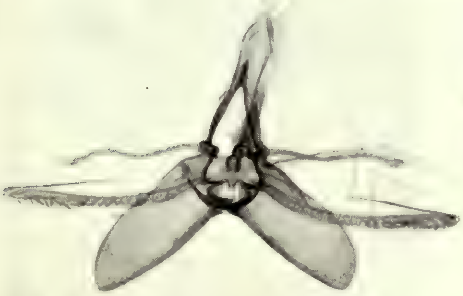
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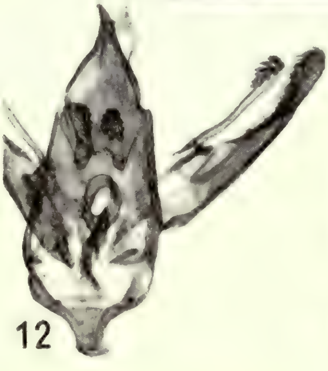
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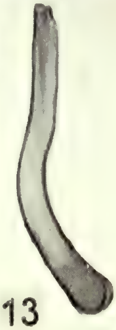
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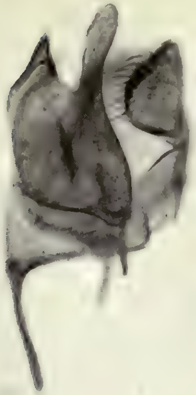
PLATE 19

Fig. 1. *Opogona mendanai* sp. n., ♂ genitalia (Slide 5152).
Fig. 2. *Ibidem*, aedeagus.
Fig. 3. *Opogona meeki* sp. n., ♀ genitalia (Slide 5623).
Fig. 4. *Ibidem*, ostium.
Fig. 5. *Ibidem*, signum.
Fig. 6. *Opogona guppyi* sp. n., ♂ genitalia (Slide 5122).
Fig. 7. *Ibidem*, aedeagus.
Fig. 8. *Opogona guppyi* sp. n., ♀ genitalia (Slide 5065).
Fig. 9. *Ibidem*, ostium.
Fig. 10. *Ibidem*, signum, lateral view showing one of the paired prongs.
Fig. 11. *Decadarchis emphera* sp. n., ♂ genitalia (Slide 5590).
Fig. 12. *Ibidem*, aedeagus.
Fig. 13. *Decadarchis semifusca* sp. n., ♂ genitalia (Slide 3865).
Fig. 14. *Ibidem*, aedeagus.
Fig. 15. *Ischnocanaba euryzona* gen. n., sp. n., ♂ genitalia (Slide 5117).



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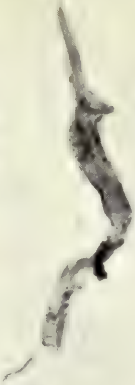

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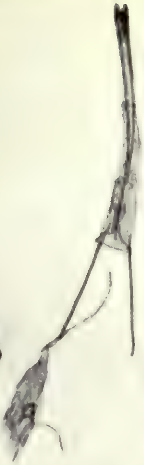

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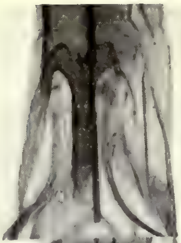

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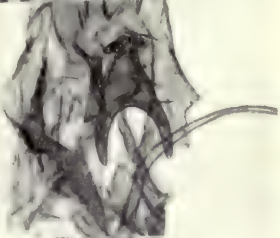

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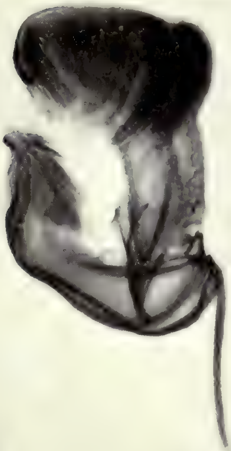

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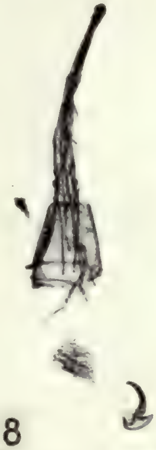

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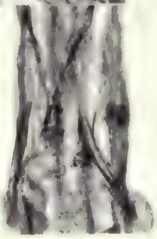

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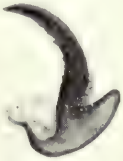

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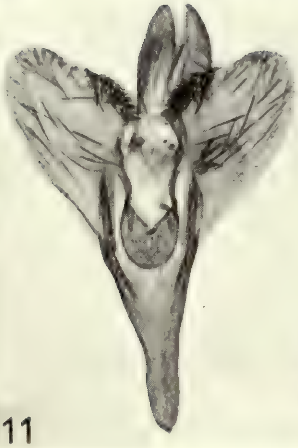

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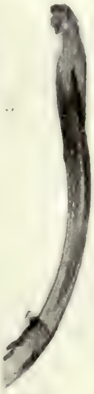

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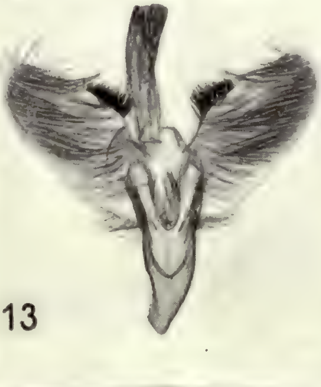

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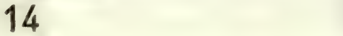

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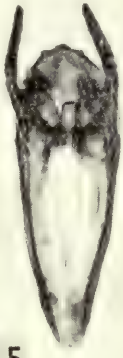

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A REVISION OF THE GENUS *DUCETIA* STÅL (ORTHOPTERA : TETTIGONIIDAE)

D. R. RAGGE

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 10 No. 5
LONDON : 1961

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BY

D. R. RAGGE

Pp. 169–208 ; 91 *Text-figures*

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SYNOPSIS

The genus *Ducetia* Stål is fully revised. Five generic and five specific synonyms are newly established, and nine new species are described. The status of *Noia testacea* Walker is discussed.

INTRODUCTION

In addition to those which have been described in *Ducetia* Stål and *Noia* Walker, this revision covers all the species, with the exception of *Isotima japonica* Matsumura & Shiraki, which have been described in the genera *Isotima* Brunner, *Paura* Karsch, *Pseudisotima* Schulthess, *Kuwayamaea* Matsumura & Shiraki, and *Telaea* Bolivar. These five generic names are here newly synonymized : the first (together with *Isotimula* Uvarov) with *Noia* Walker, and the remainder with *Ducetia* Stål. *Isotima japonica* Matsumura & Shiraki was placed by Bei-Bienko (1954) in the genus *Anisotima* Bei-Bienko. Its wing-venation, though reduced, does not suggest any connection with *Ducetia* Stål, and, both because of this and to avoid the homonymy which would result from the inclusion of this species in *Ducetia* Stål, I have excluded it from this revision.

The genus *Ducetia* was erected by Stål in 1874 for the single species *Locusta japonica* Thunberg, 1815. In 1878 Brunner added three further species : *D. adspersa* Brunner (based on a rather aberrant specimen of *D. japonica* (Thunberg) (see p. 182)), *D. ceylanica* Brunner, and *D. punctipennis* (Gerstaecker). With the addition of this last species, described from Kenya, the genus was recognized as extending beyond the Orient into the Ethiopian Region. At the same time Brunner published a preliminary description of *chinensis*, placing it in his new genus *Isotima*. Although the holotype of this species, which was stated by Brunner to be in Budapest, is almost certainly now destroyed, there can be little doubt as to which species is involved, and there seems to be no taxonomic feature to justify placing it in a separate genus.

Ten years later Karsch (1888) erected the genus *Paura* for two new species *P. biramosa* Karsch and *P. reticulosa* Karsch. These species were each based on a unique female specimen, and the holotypes have proved to be females of two sexually dimorphic African species of *Ducetia* Stål, one of them already known from the male as *D. punctipennis* (Gerstaecker). This situation is discussed more fully on p. 202.

In 1891 Brunner added *D. cruciata* and at the same time described *Isotima javanica*. This latter species is without doubt congeneric with *D. japonica* (Thunberg), from which it is a brachypterous derivative. The African species *Pseudisotima punctata* Schulthess, 1898, is a similar case, being derived by reduction of the wings from *D. punctipennis* (Gerstaecker) ; here again a separate genus is quite unwarranted. Two further African species have been described since this time : *D. loosi* Griffini, 1908 and *D. fuscopunctata* Chopard, 1954.

Bolivar erected the genus *Telaea* in 1922 for the species *T. quadripunctata* Bolivar. The holotype of this species was found close to the type locality of *D. punctipennis* (Gerstaecker), and the type specimens of these two species are undoubtedly conspecific.

The genus *Noia* Walker, erected in 1870 for the brachypterous species *N. testacea* Walker, presents something of a problem. It agrees with *Ducetia* Stål in every feature of taxonomic importance, but unlike the two brachypterous species of that genus it shows no close affinities with any macropterous species. Unfortunately, *Noia* Walker has priority over *Ducetia* Stål ; if it were not for this I should have little hesitation in regarding *testacea* as a third, though rather aberrant, brachypterous species of *Ducetia* Stål. However, it would be most undesirable to replace such a well-known name as *Ducetia* Stål by a name which has barely appeared in the literature since its creation in 1870. For reasons mainly of convenience I am therefore giving *Noia* Walker separate generic status in this revision. When our knowledge of the group is in a more advanced state, it may be advisable to apply to the International Commission on Zoological Nomenclature for the suppression of the name *Noia* Walker in favour of *Ducetia* Stål. In this revision *Noia testacea* Walker is included in the key to the species of *Ducetia* Stål. The generic name *Isotima* Brunner (together with the nom. n. *Isotimula* Uvarov) is here synonymized with *Noia* Walker, on the ground that the holotypes of the respective type species are conspecific.

In this revision nine new species are described, bringing the total number of species in *Ducetia* Stål to twenty Five generic and five specific synonyms are newly established. Access was gained to all the existing type specimens, including those representing synonyms, except for one in Japan and one in Genoa.

ACKNOWLEDGMENTS

My most sincere gratitude is due to the following specialists who have spared time and energy to send me type specimens or other material from their respective museums ;

Mr. P. Basilewsky, Dr. M. Beier, Dr. L. Chopard, Mr. A. Collart, Dr. A. Diakonoff, Mr. K. Günther, Mr. H. M. Hale, Mr. A. J. Hesse, Professor C. H. Lindroth, Dr. L. Mistshenko, Mr. J. A. G. Rehn, and Mr. R. Roy.

I am also most grateful to the following workers, who have been kind enough to send me specimens which they have collected personally:

Dr. S. Asahina, Mr. E. S. Brown, and Mr. and Mrs. R. W. Crosskey.

Finally I wish to thank Miss P. M. Stock for her practical assistance.

MATERIAL

In addition to the collection of *Ducetia* Stål in the British Museum (Natural History) material was lent by the sources listed below, through the courtesy of the specialists mentioned above.

Musée Royal du Congo Belge, Tervuren; Naturhistorisches Museum, Vienna; Muséum National d'Histoire Naturelle, Paris; Institut Royal des Sciences Naturelles de Belgique, Brussels; Rijksmuseum van Natuurlijke Historie, Leiden; Zoologische Museum of the Humboldt-Universität, Berlin; South Australian Museum, Adelaide; South African Museum, Cape Town; Universitetets Zoologiska Institution, Lund; Zoological Institute of the Academy of Sciences of the U.S.S.R., Leningrad; Academy of Natural Sciences of Philadelphia; Institut Français d'Afrique Noire, Dakar, Senegal.

DUCETIA Stål, 1874

Ducetia Stål, 1874, *Recensio Orthopterorum*, **2**: 11. Type species, by monotypy, *Locusta japonica* Thunberg, 1815.

Paura Karsch, 1888, *Berl. ent. Z.* **32**: 439. Type species, by subsequent designation (Kirby, 1906, p. 407), *Paura biramosa* Karsch, 1888. ***Syn. n.***

Pseudisotima Schulthess, 1898, *Ann. Mus. Stor. nat. Genova*, **39**: 199. Type species, by monotypy, *Pseudisotima punctata* Schulthess, 1898. ***Syn. n.***

Kuwayamaea Matsumura & Shiraki, 1908, *J. Coll. Agric. Tokyo*, **3**: 7. Type species, by original designation, *Kuwayamaea sapporensis* Matsumura & Shiraki, 1908. ***Syn. n.***

Telaea Bolivar, 1922, *Voy. M. Rothschild E. Afr. Anim. Art.* **1**: 201. Type species, by monotypy, *Telaea quadripunctata* Bolivar, 1922. ***Syn. n.***

DIAGNOSIS. ♂♀. Radius of fore wings almost always with pectinately arranged posterior branches (except in brachypterous species), usually three or more in number and often closely parallel to each other. Pronotum without lateral carinae; lateral pronotal lobes with more or less distinct angle in antero-ventral region of margin. Fastigium of vertex compressed, sulcate above. Fore tibiae with oval tympanic opening on both sides. Fore coxal spine very small or absent.

DISCUSSION. The species of this genus show a general tendency to have a comparatively large number of pectinate branches on the radius of the fore wing. This feature reaches its fullest expression in such species as *D. japonica* (Thunberg), *D. loosi* Griffini, *D. costata* sp. n., and *D. ramulosa* sp. n. In several of the African species these branches tend to be arranged rather irregularly, so that the pectinate pattern sometimes becomes obscured; examples of this are shown by *D. crosskeyi* sp. n. and *D. chelocerca* sp. n. In *D. chinensis* (Brunner), which has somewhat reduced wings, there are too few radial branches in the fore wings to show clearly their pectinate arrangement, and in the brachypterous species *D. javanica* (Brunner) and *D. punctata* (Schulthess) the pectinate pattern is quite lost. In *D. furcata* sp. n. the radius presents a complete departure from the arrangement typical of the genus in having a bifurcate sector.

In the oriental species the venational feature mentioned above, when shown by the male, is shown in exactly the same way by the female. In fact, apart from the usual differences in the genitalia and stridulatory organ, the sexes are closely similar. This is also true of the two African species *D. loosi* Griffini and *D. fuscopunctata* Chopard, and in the very brachypterous species *D. punctata* (Schulthess) the sexes again resemble each other quite closely. However, the females of *D. punctipennis* (Gerstaecker) and *D. biramosa* (Karsch) are markedly different from the males: they have no hind wings and the venation of the fore wings is too reduced for there to be more than a suggestion of a pectinate arrangement in the radial branches. In the remaining eight African species the female sex still remains to be found and the extent to which sexual dimorphism is shown by each of them must remain unknown for the present. It would of course be most interesting to know whether the females of any of these species show intermediate stages in sexual dimorphism between the normal condition (as found in *D. loosi* Griffini, for example) and the extreme cases mentioned above.

It is possible to trace certain evolutionary trends within the genus, and I have attempted to represent these diagrammatically in Text-fig. 1. The species *japonica*, *furcata*, *cruciata*, and *ceylanica*, form a fairly homogeneous unit in the Oriental Region, and *javanica* represents a brachypterous, but otherwise unchanged, derivative from *japonica*. A less extreme trend towards brachypterism is shown by *chinensis*; neither this species nor *spatula* has any very close affinity with the other oriental species. *Noia testacea* Walker is related to the oriental species of *Ducetia* Stål, but again shows no close affinity with any one of them. Among the African species, *loosi* and its very close relative *fuscopunctata* represent the closest approach to the oriental facies (as typified by *japonica*), though there may be some phylogenetic connection between *crosskeyi* and either *spatula* or *chinensis*. *Macrocerca* and *costata* are probably offshoots from *loosi*. The three species *chelocerca*, *ramulosa*, and *sagitta*, show a development towards the distinctive East African facies, typified by *punctipennis*. This trend reaches its fullest expression in the deserticolous species *vitriala* and *parva*. *Punctata* is clearly a brachypterous offshoot from *punctipennis*.

Distribution (see Text-fig. 2). The range of this genus covers most of the Ethiopian Region and extends through the Oriental Region to New Guinea, the Solomon Is., and northern Australia. It also includes Manchuria, Korea and Japan.

Key to the Species (including *Noia testacea* Walker, see p. 207)

Males

1.	Hind wings rudimentary	2
–.	Hind wings well developed	4
2.	Subgenital plate deeply bifurcate, as in Text-figs. 5 and 23 (Oriental Region) .	3

–. Subgenital plate bilobed but not deeply bifurcate, as in Text-fig. 20. (Ethiopian Region) . . . . *D. punctata* (Schulthess) (p. 203)
3. Subgenital plate as in Text-fig. 5. Cerci as in Text-fig. 32 *D. javanica* (Brunner) (p. 188)
–. Subgenital plate as in Text-fig. 23. Cerci as in Text-fig. 50 *Noia testacea* Walker (p. 207)
4. Palaearctic, Oriental, and Australasian species 5
–. African species 10

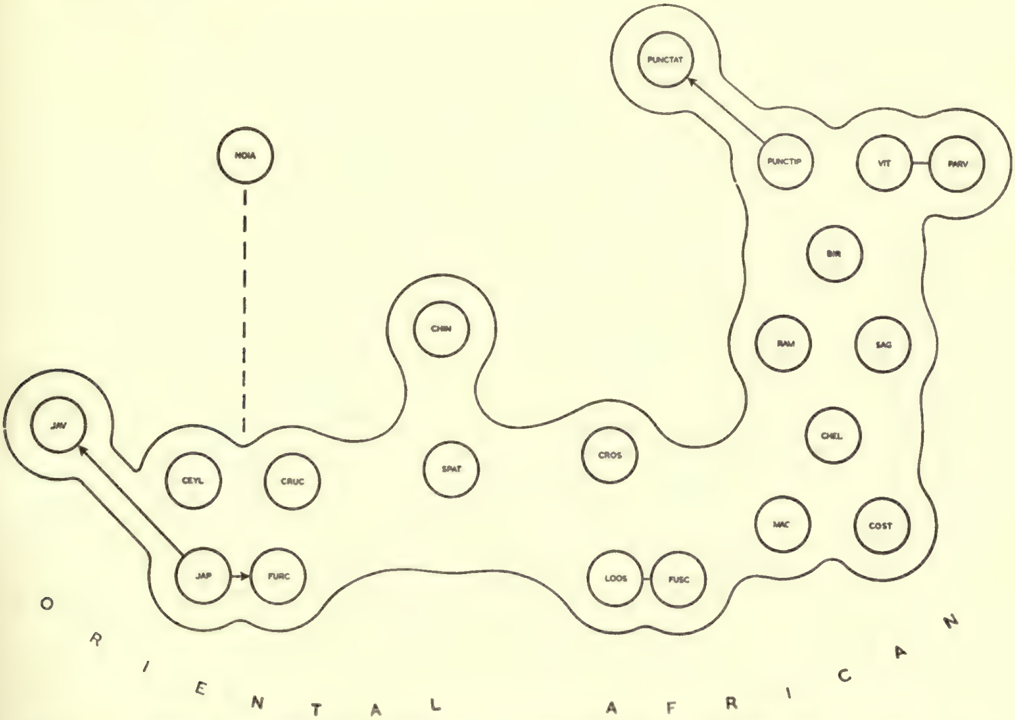


FIG. 1. Diagram showing the probable inter-relationships of the species of *Ducetia* Stål. (The abbreviations of specific names are the same as those given in Text-figs. 3–23.)

5. Subgenital plate with two inwardly-directed apical teeth, as in Text-fig. 24, not bifid when viewed from below (Text-fig. 8) . . *D. chinensis* (Brunner) (p. 190)
–. Subgenital plate without apical teeth, bifid when viewed from below . . . 6
6. Fore wings more than 35 mm. in length. Subgenital plate as in Text-fig. 7 *D. ceylanica* Brunner (p. 189)
–. Fore wings less than 35 mm. in length. Subgenital plate not as in Text-fig. 7 . 7
7. Subgenital plate as in Text-fig. 6, the distal lobes widely separated *D. cruciata* Brunner (p. 189)
–. Subgenital plate not as in Text-fig. 6, the distal lobes contiguous or nearly so (Text-figs. 3, 4, and 9) 8
8. Cerci as in Text-fig. 36, with a dorsal and ventral ridge at the apex. Subgenital plate as in Text-figs. 9 and 26 . . . . . *D. spatula* sp. n. (p. 191)
–. Cerci as in Text-fig. 30 or 31, with only a ventral ridge at the apex or without ridges. Subgenital plate not as in Text-figs. 9 and 26 9
9. Venation of fore wings as in Text-fig. 52, R branched dichotomously. Cerci as in Text-fig. 31, without an apical ridge . . . . *D. furcata* sp. n. (p. 186)

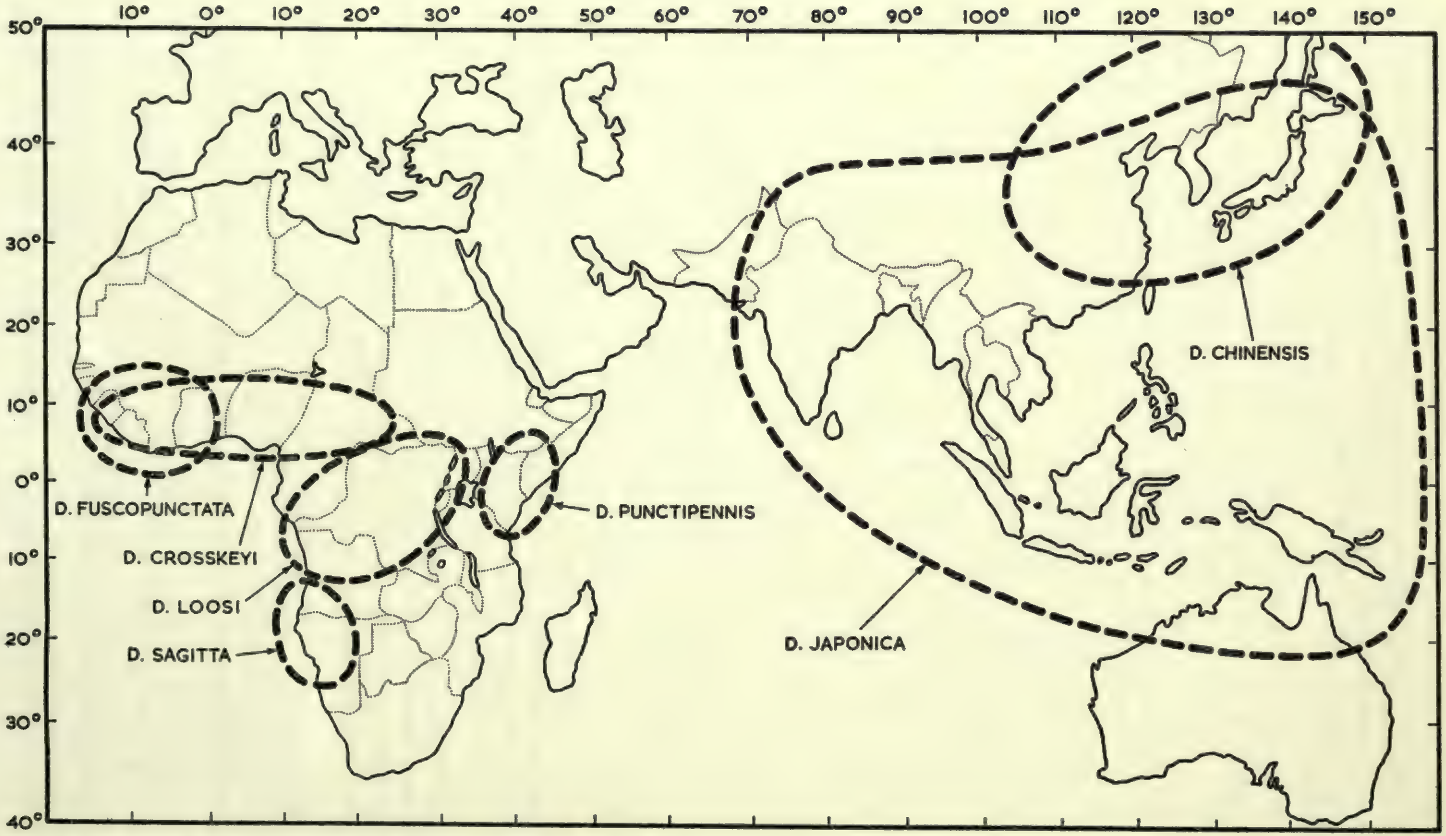
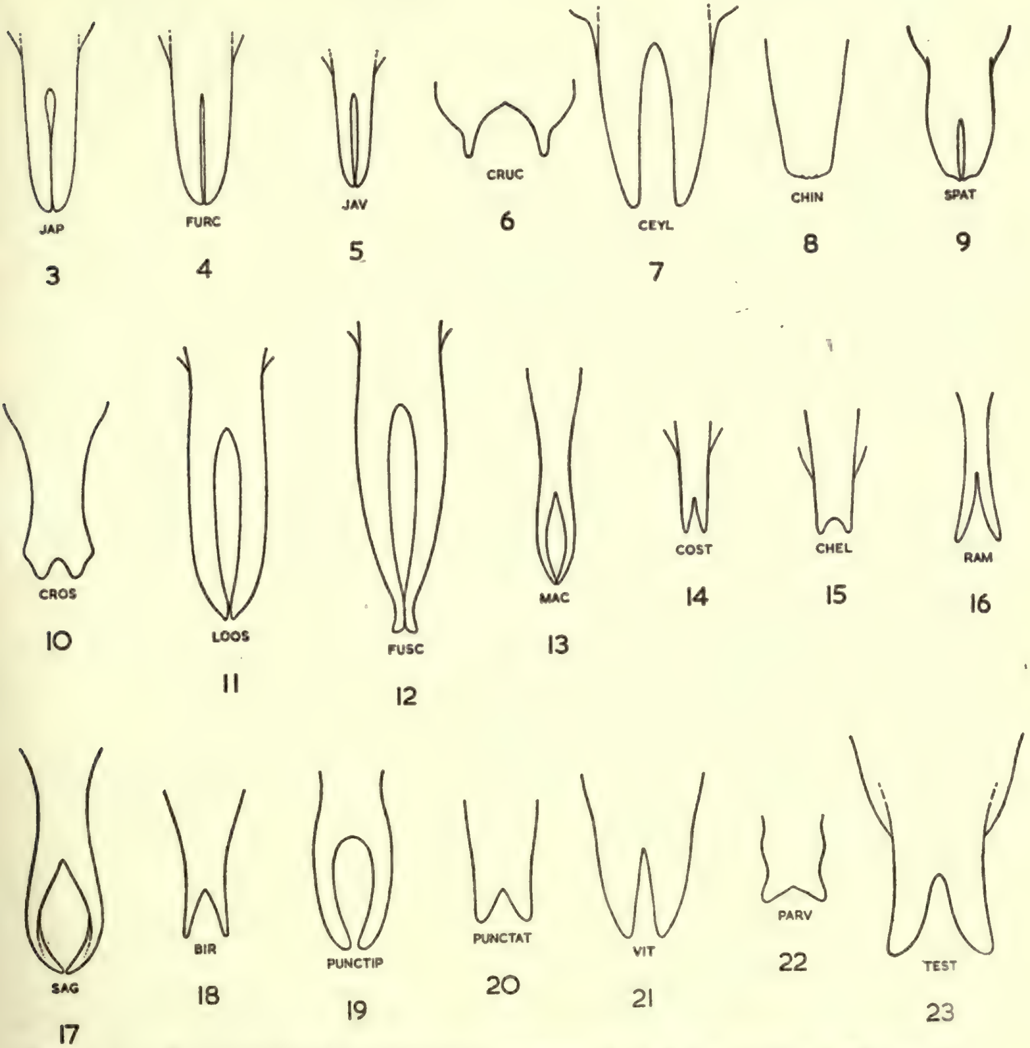

D. CHINENSIS
D. JAPONICA
D. PUNCTIPENNIS
D. FUSCOPUNCTATA
D. CROSSKEYI
D. LOOSI
D. SAGITTA
10°
0°
10°
20°
30°
40°
50°
60°
70°
80°
90°
100°
110°
120°
130°
140°
150°
50°
40°
30°
20°
10°
0°
10°
20°
30°
40°

FIG. 2. Map showing the approximate distribution of some of the species of *Ducetia* Stål.

–. Venation of fore wings as in Text-fig. 51, R branched pectinately. Cerci as in Text-fig. 30, with an interno-ventral ridge at the apex *D. japonica* (Thunberg) (p. 182)

10. Subgenital plate as in Text-figs. 10, 25, and 27, with two inwardly-directed apical teeth . . . . *D. crosskeyi* sp. n. (p. 192)

—. Subgenital plate not as in Text-figs. 10, 25, and 27, without apical teeth . . 11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CHIN
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FUSC
12
MAC
13
COST
14
CHEL
15
RAM
16
SAG
17
BIR
18
PUNCTIP
19
PUNCTAT
20
VIT
21
PARV
22
TEST
23

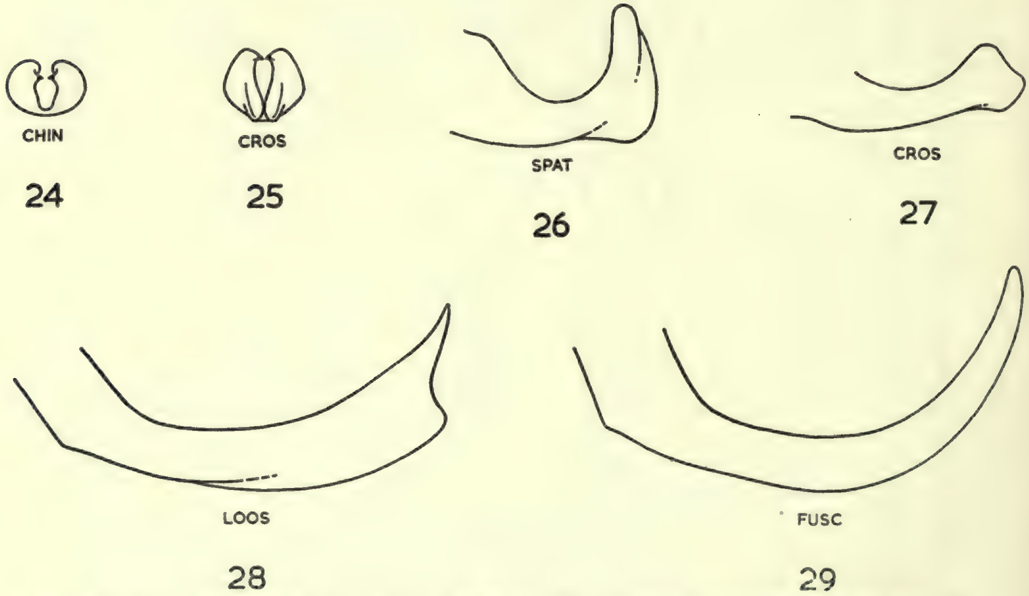
FIGS. 3–23. Ventral view of the male subgenital plate of (3) *Ducetia japonica* (Thunberg); (4) *D. furcata* sp. n.; (5) *D. javanica* (Brunner); (6) *D. cruciata* Brunner; (7) *D. ceylanica* Brunner; (8) *D. chinensis* (Brunner); (9) *D. spatula* sp. n.; (10) *D. crosskeyi* sp. n.; (11) *D. loosi* Griffini; (12) *D. fuscopunctata* Chopard; (13) *D. macrocerca* sp. n.; (14) *D. costata* sp. n.; (15) *D. chelocerca* sp. n.; (16) *D. ramulosa* sp. n.; (17) *D. sagitta* sp. n.; (18) *D. biramosa* (Karsch); (19) *D. punctipennis* (Gerstaecker); (20) *D. punctata* (Schulthess); (21) *D. vitriala* sp. n.; (22) *D. parva* sp. n.; (23) *Noia testacea* Walker.

11. Lobes of the subgenital plate converging apically, contiguous, or almost so, at the apex (Text-figs. 11, 12, 13, 17, or 19) 12

—. Lobes of the subgenital plate diverging apically, widely separated at the apex (not as in Text-figs, mentioned) 18

12. Right fore wing showing an expanded transparent area with regular cross-veins along the more proximal part of the posterior edge (not visible when the wings are flexed), as in Text-fig. 61. Cerci relatively long, extending at least to the apex of the subgenital plate . . . . *D. macrocerca* sp. n. (p. 195)

—. Right fore wing not as in Text-fig. 61. Cerci relatively shorter, not reaching the apex of the subgenital plate 13



FIGS. 24–29. *Ducetia* Stål. 24–25. End view of the male subgenital plate of (24) *D. chinensis* (Brunner); (25) *D. crosskeyi* sp. n. 26–29. Lateral view of the male subgenital plate of (26) *D. spatula* sp. n.; (27) *D. crosskeyi* sp. n.; (28) *D. loosi* Griffini; (29) *D. fuscopunctata* Chopard.

13. Fore wings of shiny and transparent texture 14

—. Fore wings opaque and not shiny 15

14. Subgenital plate as in Text-fig. 19 . . . . *D. punctipennis* (Gerstaecker) (p. 202)

—. Subgenital plate as in Text-fig. 21 . . . . . . *D. vitriala* sp. n. (p. 204)

15. Right fore wing with a transparent patch in the basal region of areas R and MA *D. punctipennis* (Gerstaecker) (p. 202)

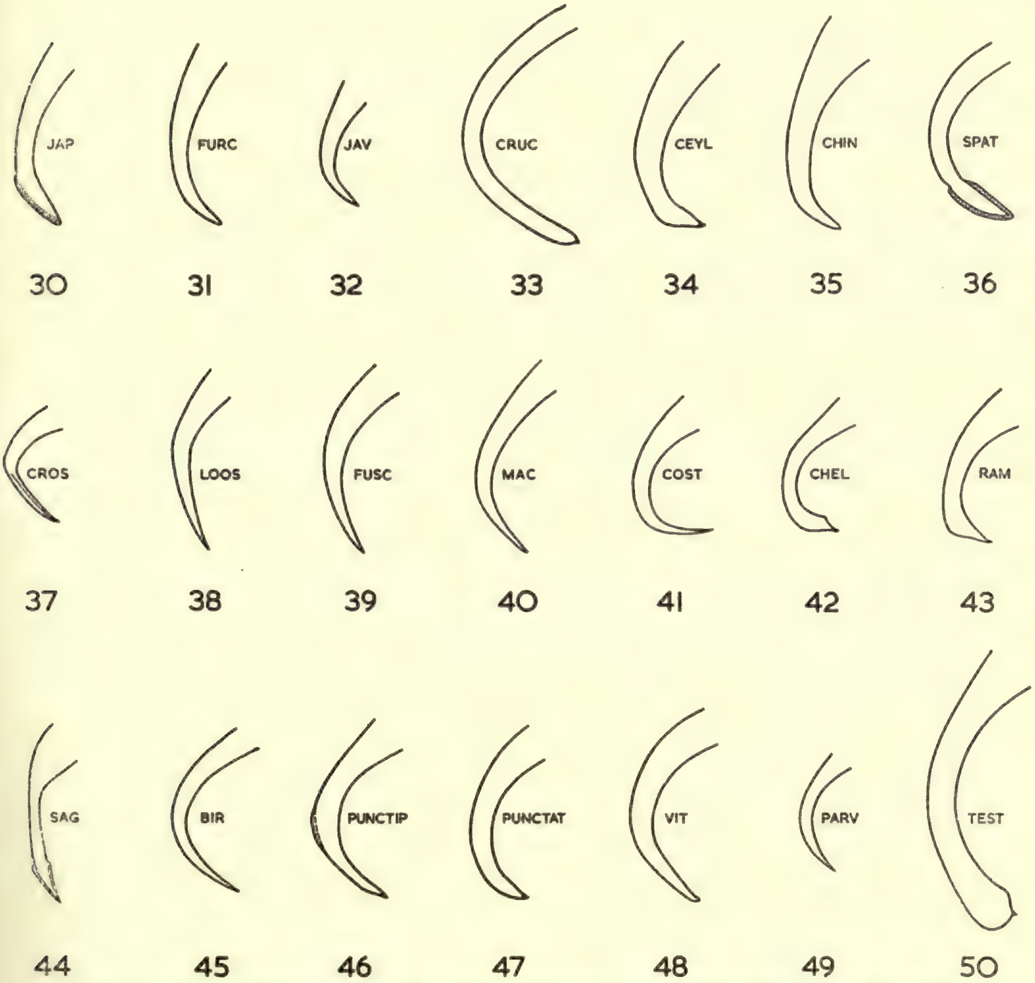
—. Areas R and MA of the right wing uniformly opaque 16

16. Cerci swollen at the base, then abruptly constricted, and with a characteristically shaped apex, as in Text-fig. 44. Subgenital plate, when viewed from below, as in Text-fig. 17 . . . . *D. sagitta* sp. n. (p. 199)

—. Cerci tapering more uniformly from the base, as in Text-figs. 38 and 39. Subgenital plate, when viewed from below, as in Text-figs. 11 or 12 17

17. Subgenital plate, when viewed from the side, as in Text-fig. 28 . *D. loosi* Griffini (p. 193)

—. Subgenital plate, when viewed from the side, as in Text-fig. 29 . *D. fuscopunctata* Chopard (p. 194)
18. R of the fore wing with at least five posterior branches, as in Text-figs. 62 and 64 . 19
—. R of the fore wing with four posterior branches or fewer 20
19. Cerci somewhat swollen subapically, as in Text-fig. 43 . *D. ramulosa* sp. n. (p. 198)
—. Cerci not swollen subapically, with a long fine point, as in Text-fig. 41 *D. costata* sp. n. (p. 196)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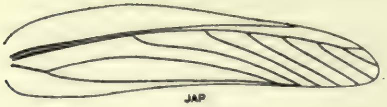
FIGS. 30–50. Dorsal view of the left male cercus of (30) *Ducetia japonica* (Thunberg); (31) *D. furcata* sp. n.; (32) *D. javanica* (Brunner); (33) *D. cruciata* Brunner; (34) *D. ceylanica* Brunner; (35) *D. chinensis* (Brunner); (36) *D. spatula* sp. n.; (37) *D. crosskeyi* sp. n.; (38) *D. loosi* Griffini; (39) *D. fuscopunctata* Chopard; (40) *D. macrocerca* sp. n.; (41) *D. costata* sp. n.; (42) *D. chelocerca* sp. n.; (43) *D. ramulosa* sp. n.; (44) *D. sagitta* sp. n.; (45) *D. biramosa* (Karsch); (46) *D. punctipennis* (Gerstaecker); (47) *D. punctata* (Schulthess); (48) *D. vitriala* sp. n.; (49) *D. parva* sp. n.; (50) *Noia testacea* Walker.



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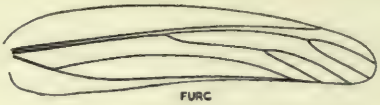

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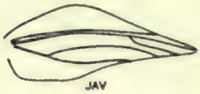

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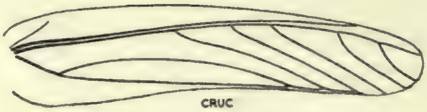

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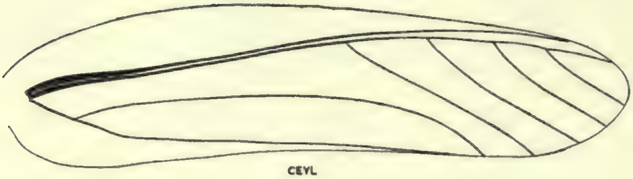

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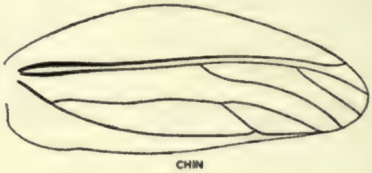

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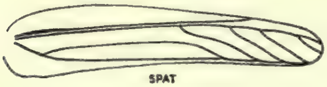

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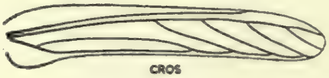

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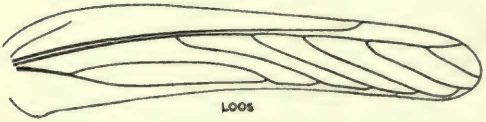

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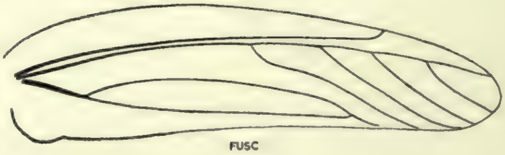

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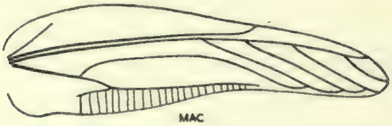

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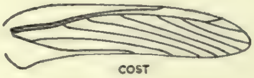

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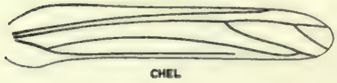

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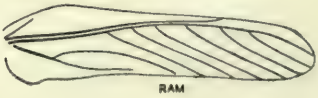
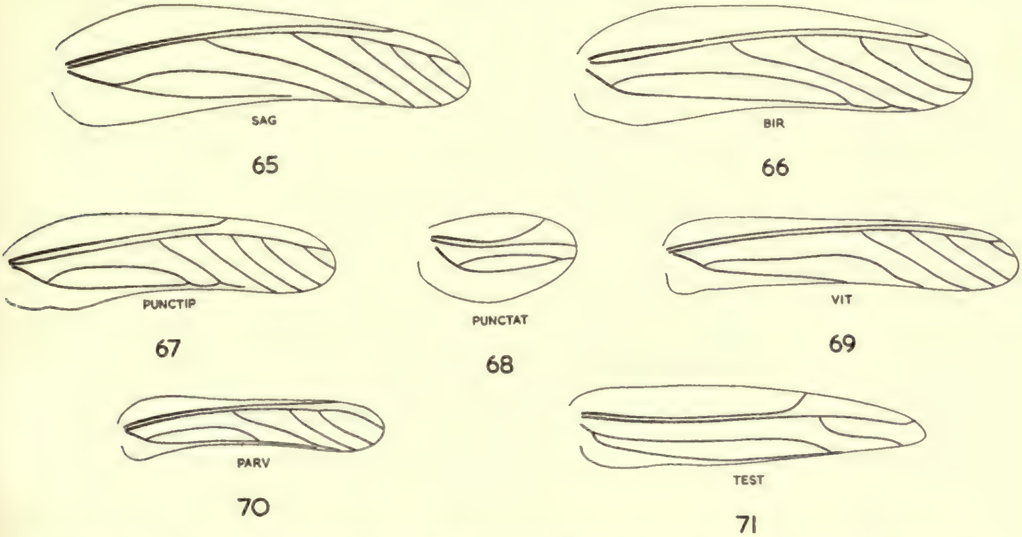


64

FIGS. 51–64. The right male fore wing of (51) *Ducetia japonica* (Thunberg) ; (52) *D. furcata* sp. n. ; (53) *D. javanica* (Brunner) ; (54) *D. cruciata* Brunner ; (55) *D. ceylanica* Brunner ; (56) *D. chinensis* (Brunner) ; (57) *D. spatula* sp. n. ; (58) *D. crosskeyi* sp. n. ; (59) *D. loosi* Griffini ; (60) *D. fuscopunctata* Chopard ; (61) *D. macrocerca* sp. n. ; (62) *D. costata* sp. n. ; (63) *D. chelocerca* sp. n. ; (64) *D. ramulosa* sp. n.

20. Fore wings of shiny and transparent texture. (Not known from south of the equator) . . . 21
—. Fore wings opaque, at least towards the base, and not particularly shiny. (Not known from north of the equator) 22
21. Subgenital plate as in Text-fig. 21. Total length more than 27 mm. *D. vitriala* sp. n. (p. 204)
—. Subgenital plate as in Text-fig. 22. Total length less than 27 mm. *D. parva* sp. n. (p. 205)
22. Cerci tapering evenly to a fine point, as in Text-fig. 45 *D. biramosa* (Karsch) (p. 200)
—. Cerci somewhat swollen subapically, as in Text-fig. 42 . *D. chelocerca* sp. n. (p. 197)



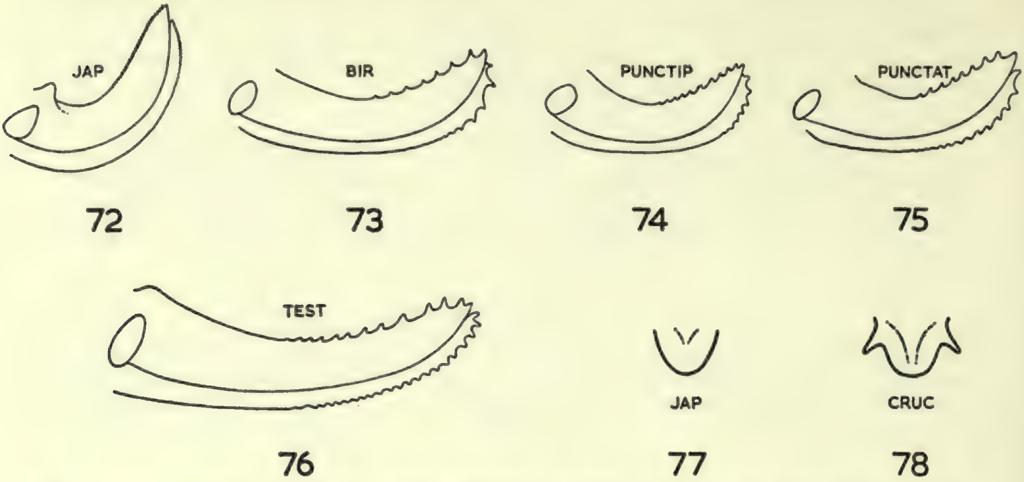
FIGS. 65–71. The right male fore wing of (65) *Ducetia sagitta* sp. n.; (66) *D. biramosa* (Karsch); (67) *D. punctipennis* (Gerstaecker); (68) *D. punctata* (Schulthess); (69) *D. vitriala* sp. n.; (70) *D. parva* sp. n.; (71) *Noia testacea* Walker.

Females

The thirteen African species are not included in this key, since the female sex is known in only seven of them. *D. spatula* sp. n., known only from the male holotype, is also omitted.

1. Hind wings rudimentary 2
–. Hind wings well developed 3
2. Ovipositor more than 8 mm. in length, shaped as in Text-fig. 76 *Noia testacea* Walker (p. 207)
–. Ovipositor less than 8 mm. in length, shaped as in Text-fig. 72 *D. javanica* (Brunner) (p. 188)
3. Hind wings extending beyond the flexed fore wings 4
–. Hind wings not extending beyond the flexed fore wings *D. chinensis* (Brunner) (p. 190)
4. R of the fore wings branched in a dichotomous fashion, as in Text-fig. 80 *D. furcata* sp. n. (p. 186)
–. R of the fore wings branched in a pectinate fashion, not as in Text-fig. 80 . . 5
5. Fore wings less than four times longer than their maximum width, their venation as in Text-fig. 83 . . . . *D. ceylanica* Brunner (p. 189)
–. Fore wings more than four times longer than their maximum width, their venation as in Text-figs. 79 and 82 6

6. Subgenital pate with a posteriorly directed process on each side, as in Text-fig. 78 *D. cruciata* Brunner (p. 188)
–. Subgenital plate unmodified, as in Text-fig. 77 . . *D. japonica* (Thunberg) (p. 182)



FIGS. 72–78. *Ducetia* Stål and *Noia* Walker. 72–76. Lateral view of the ovipositor of (72) *Ducetia japonica* (Thunberg) ; (73) *D. biramosa* (Karsch) ; (74) *D. punctipennis* (Gerstaecker) ; (75) *D. punctata* (Schulthess) ; (76) *Noia testacea* Walker. 77–78. Ventral view of the female subgenital plate of (77) *D. japonica* (Thunberg) ; (78) *D. cruciata* Brunner.

1. ***Ducetia japonica*** (Thunberg, 1815)

Locusta japonica Thunberg, 1815, *Mém. Acad. Sci. St-Pétersb.* (*Sci. phys.*) **5** : 282. Type locality : Japan. Type material lost.

Locusta (*Phaneroptera*) *quinquenervis* Haan, 1842, in Temminck, *Verh. nat. ges. Ned. overz. bezitt.*, Zool. (Ins.), p. 193. Lectotype ♂, JAPAN (*v. Siebold*). 2 ♂ and 2 ♀ syntypes, same data as lectotype. 2 ♂ syntypes, JAVA (*Blume*). All in the Rijksmuseum van Natuurlijke Historie, Leiden.

Steirodon lanceolatum Walker, 1859, *Ann. Mag. nat. Hist.* (3) **4** : 222. Lectotype ♂, CEYLON, and 3 ♀ syntypes, same data as lectotype, in the British Museum (Natural History) ; 3 syntypes, same data as lectotype, lost.

Phaneroptera neochlora Walker, 1869, Catalogue of Dermaptera Saltatoria, p. 342. Lectotype ♂, CHINA. 2 ♀ syntypes, same data as lectotype. In the British Museum (Natural History).

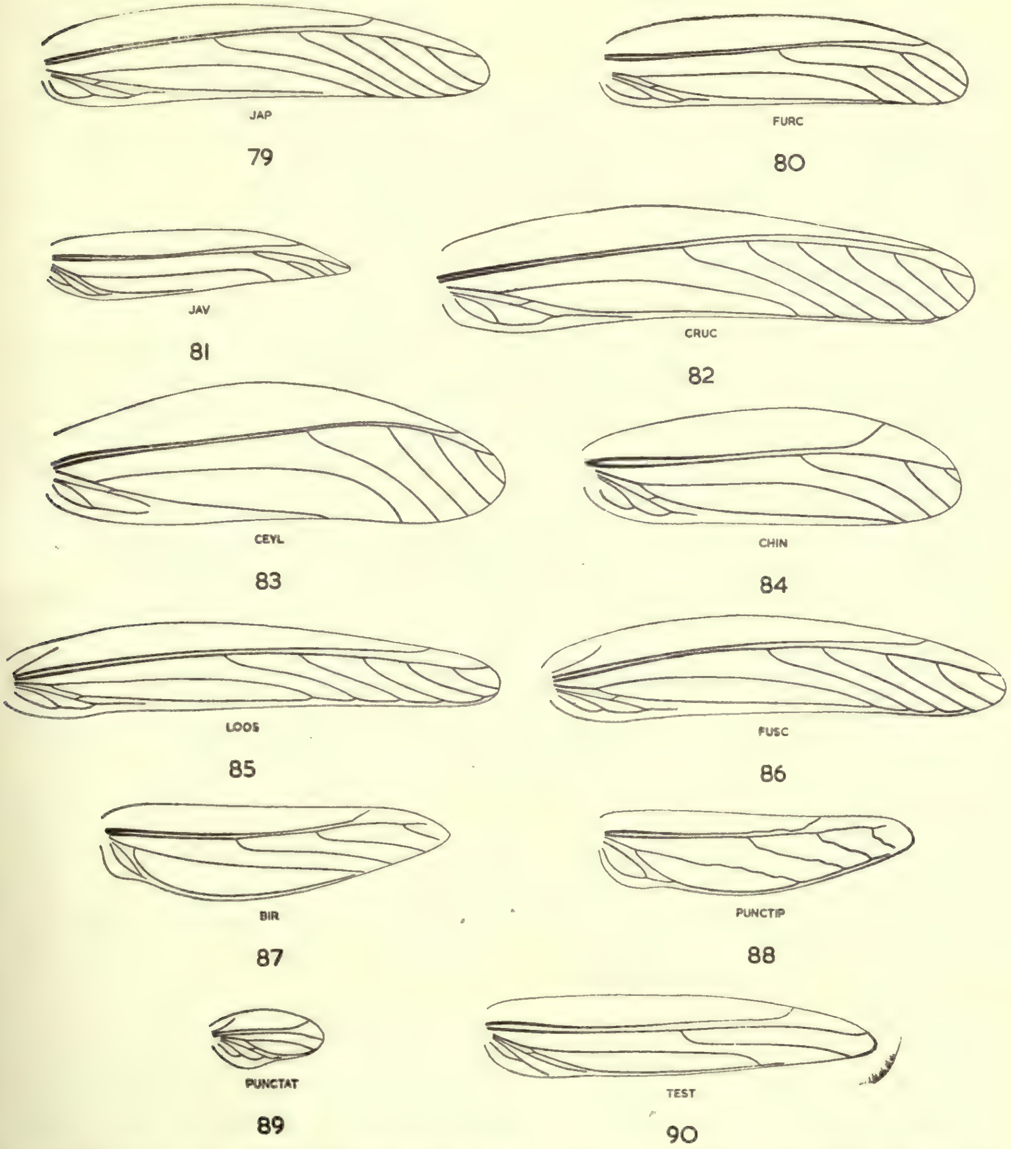
Phaneroptera privata Walker, 1869, Catalogue of Dermaptera Saltatoria, p. 344. Holotype ♂, EAST PAKISTAN : Sylhet. In the British Museum (Natural History).

Phaneroptera aliena Walker, 1869, Catalogue of Dermaptera Saltatoria, p. 347. Holotype ♂, EAST PAKISTAN : Sylhet. In the British Museum (Natural History).

Ducetia adspersa Brunner, 1878, Monographie der Phaneropteriden, p. 110. Holotype ♂, PHILIPPINE Is. : Manila. In the Zoologisches Museum of the Humboldt-Universität, Berlin. ***Syn. n.***

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 51, R almost always with 4–6 closely parallel posterior branches. Cerci as in Text-fig. 30, with interno-ventral ridge at apex. Subgenital plate as in Text-fig. 3, deeply bifurcate with contiguous lobes.

♀. Venation of fore wings as in Text-fig. 79.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FUSC
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BIR
87
PUNCTIP
88
PUNCTAT
89
TEST
90

Figs. 79–90. The right female fore wing of (79) *Ducetia japonica* (Thunberg) ; (80) *D. furcata* sp. n. ; (81) *D. javanica* (Brunner) ; (82) *D. cruciata* Brunner ; (83) *D. ceylanica* Brunner ; (84) *D. chinensis* (Brunner) ; (85) *D. loosi* Griffini ; (86) *D. fuscopunctata* Chopard ; (87) *D. biramosa* (Karsch) ; (8) *D. punctipennis* (Gerstaecker) ; (89) *D. punctata* (Schulthess) ; (90) *Noia testacea* Walker.

MEASUREMENTS

Males

Total length (20): 32·4–46·1, mean 36·84.
Median length of pronotum (20): 3·1–4·7, mean 3·68.
Length of hind femur (20): 15·0–26·6, mean 20·46.
Length of fore wing (20): 22·4–32·3, mean 25·48.

Females

Total length (20): 33·7–46·7, mean 38·56.
Median length of pronotum (20): 3·6–5·6, mean 4·02.
Length of hind femur (20): 18·5–26·8, mean 21·49.
Length of fore wing (20): 24·4–33·5, mean 27·54.
Length of ovipositor (20): 5·2–6·8, mean 5·87.

DISCUSSION. The shape and venation of the fore wings, with the five (occasionally four or six) posterior radial branches, and the male genitalia, enable this species to be easily recognized. Occasionally the regular pattern of the radial branches is lost (as in the holotype of *D. adspersa* Brunner, which clearly belongs to the present species), probably as a result of a genetic alteration, in which case identification must depend on the genitalia. Freak specimens of this sort, which occur intermingled with normal ones, may easily be confused with *D. furcata* sp. n., in which, however, the male cerci lack the interno-ventral ridge at the apex.

D. japonica (Thunberg) is the most common and widespread of the Asiatic species of *Ducetia* Stål. Although specimens from the Solomon Is. (and, to a lesser extent, New Guinea) are quite considerably larger than those from any other part of the range, there is generally very little geographical variation. Individual variation is also not very marked: the usual green colouring is occasionally replaced by brown, however, and there may or may not be dark spots on the fore wings.

I have examined the holotype of *D. adspersa* Brunner and have found it to belong to *D. japonica* (Thunberg).

I have selected and marked a male lectotype from among the syntypes of *Locusta* (*Phaneroptera*) *quinquenervis* Haan, a male lectotype from among the syntypes of *Steirodon lanceolatum* Walker, and a male lectotype from among the syntypes of *Phaneroptera neochlora* Walker.

MATERIAL EXAMINED

♂ lectotype, 1 ♂ syntype (Java), and 1 ♀ syntype (Japan), of *Locusta* (*Phaneroptera*) *quinquenervis* Haan. ♂ lectotype and 3 ♀ syntypes of *Steirodon lanceolatum* Walker. One ♂ lectotype and 2 ♀ syntypes of *Phaneroptera neochlora* Walker. ♂ holotype of *Phaneroptera privata* Walker. ♂ holotype of *Phaneroptera aliena* Walker. ♂ holotype of *D. adspersa* Brunner.

INDIA: Coorg, Fraserpet, 29.i.1924 (*Fletcher*) (1 ♂); Pusa, x.1908, on grass (*T. N. J.*) (1 ♂); Pusa, 15.xi.1904 (——) (1 ♀); Tukdah, 12 miles east of Darjeeling, 5,000 ft. (*Sevastopulo*) (1 ♂, 3 ♀); Assam (——) (1 ♂); Assam, Kahao, Lohit Valley, 4,000–5,000 ft., 15–20.xi.1926 (*Kingdon Ward*) (1 ♀); Assam, Mishmi Hills, Delai Valley, Taphlogam, 4,000–5,000 ft., 8.xi.1936 (*Steele*) (1 ♂); Assam, Mishmi Hills, Delai Valley, Chanliang, 4,840 ft., 25.xi.1936 (*Steele*) (1 ♂); Assam, Mishmi Hills, Delai Valley, Talon, 9,000–10,000 ft., 25.xi.1936 (*Steele*) (1 ♀); Shambaganur, Madura, 1922 (*Anglade*) (1 ♀); Shambaganur, Madura (——) (1 ♂); Bolampatti Valley, Coimbatore distr., 20.iv.1937 (*B.M.-C.M. Exp.*) (4 ♂, 4 ♀); Siruvani, Coimbatore distr., 1,700 ft., 23–26.ix.1938 (*B.M.-C.M. Exp.*) (1 ♀); Nadungayam, Malabar, 200 ft., 16–22.ix.1938 (*B.M.-C.M. Exp.*) (9 ♂, 5 ♀); Chenat Nair Forest, Palghet, 16.iv.1937 (*B.M.-C.M. Exp.*) (2 ♂); Top Slip Camp, Nelliampathi Hills, 26.iv.1937 (*B.M.-C.M. Exp.*) (2 ♂); Tenmalai, Travancore, 500–800 ft., 11–17.x.1938 (*B.M.-C.M. Exp.*) (1 ♀); Thekkadi, Periyar Dam, Travancore, 6–10.v.1937 (*B.M.-C.M. Exp.*) (1 ♂, 1 ♀); Pirmed, Travancore, 3,400 ft., 4–6.v.1937 (*B.M.-C.M. Exp.*) (1 ♂); Lebong, 3,000 ft., ix.1908 (*M. M. I.*) (1 ♀); Assam, nr. Ledo, vi–xi.1944 (*Rehn*) (5 ♂, 3 ♀); Assam, south side of R. Brahmaputra, opposite Sadiya, 24.vii.1944 (*Rehn*) (1 ♀); Kallar, 1,500 ft., 18.v.1923 (*Nathan*) (1 ♂); Coorg, Sidapur, 13–14.v.1914 (*Fletcher*) (1 ♂); Bellary distr., Ramandrug, 3,500 ft., on *Lantana*, 29.viii.1918 (*A. G. R.*) (1 ♂); Pakistan: Dacca, vii–ix.1945 (*Leston*) (1 ♂, 1 ♀); Ceylon: Peradeniya, 1909–10 (*Green*) (7 ♂); Peradeniya, iii.1901 (——) (1 ♂); Peradeniya, iii.1907 (——) (1 ♂); —— (*Green*) (1 ♂); Wavena Estate, v.1954 (*Brown*) (1 ♂); ——, 1891 (*Heuser*) (3 ♂, 2 ♀) (Nat. Mus. Vienna); Kashmir: Srinagar, 5,200 ft., at light, 5.viii.23 (*Fletcher*) (1 ♂); Nepal: Phewa Tal, nr. Pokhara, 2,500 ft., 10.v.1954 (*Quinlan*) (1 ♂); Sikkim: Gantok, 5,000 ft., in vegetation, 26.vii.1924 (*Hingston*) (2 ♂); Tibet: Zayul, Rima, 5,000 ft., 11.viii.1933 (*Kingdon Ward & Kaulback*) (1 ♀); Burma: Shingbwiyang, 665 ft., v–vi.1945 (*Rehn*) (3 ♂); Myitkyina, 9–10.vi.1944 (*Rehn*) (2 ♂); —— (*Hough*) (1 ♂); 27° 50′ N., 97° 50′ E., 3,000 ft., 12.ix.1926 (*Kingdon Ward*) (1 ♂); Sadon, 1.vii.1934 (*Malaise*) (1 ♂); Mishmi Hills, Delei River, 1,700 ft., 1.ii.1935 (*Steele*) (1 ♀); Mishmi Hills, Pange, 1,650 ft., 23.i.1935 (*Steele*) (2 ♂); Nam Tamai Valley, 27° 42′ N., 97° 54′ E., 3,000 ft., vii–ix.1938 (*Kaulback*) (7 ♂, 4 ♀); Nam Tamai Valley, 27° 40′ N., 97° 55′ E., 3,800 ft., 22.vii.1938 (*Kaulback*) (2 ♂, 1 ♀); Nam Tamai Valley, 3,500 ft., 12.ix.1938 (*Kaulback*) (1 ♀); Seinghku Valley, Nam Tamai, 28° 5′ N., 97° 35′ E., 4,000 ft., 13–14.viii.1926 (*Kingdon Ward*) (1 ♂, 1 ♀); China: Ushan, nr. Tsingtau, ix–x.1954 (*Bei-Bienko*) (1 ♂, 1 ♀); Foochow, 1936–38 (*Yang*) (5 ♂, 3 ♀); Hainan, Mt. Wuchi, 15–21.v.1903 (——) (3 ♂); Thailand: Bangkok Noi, 11.vi.1926 (*Ladell*) (1 ♀); Upper Pran (?) River, 12.iv.1926 (*Ladell*) (1 ♀); Patalung, at light, 4.v.1924 (*Evans*) (1 ♀); Indo-China: South Annam, Langbian Province, Langbian Peaks, 6,000–7,500 ft., iv.1918 (*Boden Kloss*) (1 ♂); Tonkin, 1908 (*Gronvelle*) (1 ♂) (Mus. Hist. Nat. Paris); Korea: —— (——) (1 ♂); Japan: Sagami-Hakusan, 25.ix.1949 (*Fukuhara*) (1 ♂); Tokyo, Setagaya Nezu-hill, 15.viii.1948 (*Fukuhara*) (1 ♀); —— (——) (1 ♂); Tokyo, 7.v.1938 (*Abe*) (1 ♂) (Zool. Inst. Lund.); —— (*Dönitz*) (1 ♀) (Zool. Mus. Berlin); ——, 1891 (*Deyrolle*) (1 ♀) (Mus. Hist. Nat. Paris); Formosa: —— (*Holst*) (1 ♂); Takao, vii–x.1907 (*Sauter*) (2 ♂, 3 ♀) (Nat. Mus. Vienna); Lake Candidius, 15–31.x.1907 (*Sauter*) (1 ♂) (Nat. Mus. Vienna); Malaya: Batang Padang, 10.iii.1921 (*Pendlebury*) (1 ♂); Kuala Lumpur, at light, 1922–31 (*Pendlebury*) (4 ♂, 1 ♀);

Kuala Lumpur, 1921–26 (*Pendlebury*) (4 ♂) ; Senangor, Cheras Road, at light, 1924–27 (*Seimund*) (3 ♂) ; Kedah, nr. Jitra, catchment area, at light, 4–10.iv.1928 (*Pendlebury*) (15 ♂) ; Selangor, Bukit Cherakah, 27–31.vii.1921 (*Pendlebury*) (1 ♂) ; Senangor, Ginting Bidai, 2,000 ft. (*Kloss*) (1 ♂, 1 ♀) ; Kuala Lumpur (*Lea et al.*) (1 ♂) (South Australian Museum) ; Gap, Fraser's Hill (*Lea*) (1 ♀) (South Australian Museum) ; Pahang, Kuala Jahan, 300 ft., 26.xi.1921 (*Pendlebury*) (1 ♂) ; Batang Padang, 24.v.1923 (*Pendlebury*) (1 ♂) ; Jelai Pahang, 1917 (——) (1 ♂, 1 ♀) ; Klang Gates, vii–x.1932 (*Miller*) (2 ♂, 1 ♀) ; Kuanton Pahang, 8.vi.1933 (*Miller*) (1 ♂) ; Bukit Cherakah, 10.vii.1932 (*Miller*) (2 ♂) ; The Gap, in jungle, 8.viii.1928 (*Miller*) (1 ♀) ; Kuala Lumpur, at light, viii–ix.1928 (*Miller*) (4 ♂) ; Kuala Lumpur, ii.1929 (*Miller*) (2 ♂) ; Tampin, 30.iv.1936 (*Miller*) (1 ♂) ; SINGAPORE : —— (*Ridley*) (3 ♂) ; SUMATRA : xi.1877–vi.1878 (——) (3 ♂, 1 ♀) (Rijksmus. Nat. Hist. Leiden) ; Deli (*Martin*) (1 ♂, 1 ♀) (Zool. Mus. Berlin) ; JAVA : Tengger Mts. (*Fruhstorfer*) (1 ♀) (Zool. Mus. Berlin) ; Tjikavang, xi.1937 (*Walsh*) (1 ♀) (Zool. Inst. Lund) ; Tjikavang, Mt. Djampang, x.1937 (*Walsh*) (1 ♂, 1 ♀) (Zool. Inst. Lund) ; Buitenzorg (*Lea*) (1 ♂) (South Australian Museum) ; SARAWAK : 1909 (*Brooks*) (1 ♀) ; BORNEO : Samarinda, ii.1939 (*Walsh*) (1 ♂) (Zool. Inst. Lund) ; Sambas, 1891 (*Bosscha*) (1 ♂) (Rijkmus. Nat. Hist. Leiden) ; PHILIPPINE IS. : —— (*Banks*) (1 ♂, 1 ♀) ; —— (*Ledyard*) (1 ♀) ; TUKANGBESI IS. : Binongko, Toekang, 7–10.iii.1930 (*Snellius Exp.*) (1 ♂) (Rijksmus. Nat. Hist. Leiden) ; NEW GUINEA : Maprik, 28.x.1957 (*Smart*) (1 ♂) ; Lumi, 1.xi.1957 (*Smart*) (1 ♀) ; Popondetta distr., Sangara, 23.iii.1956 (*Brown*) (2 ♂) ; NE. Papua, Mt. Lamington, 1,300–1,500 ft. (*McNamara*) (4 ♂, 2 ♀) (South Australian Museum) ; N. Territory, Groote Eylandt (*Tindale*) (1 ♂) (South Australian Museum) ; Madang (*Lohe*) (1 ♂) (South Australian Museum) ; AUSTRALIA : Cairns distr. (*Lea*) (2 ♀) (South Australian Museum) ; Cairns (*Lea*) (1 ♂) (South Australian Museum) ; Cairns distr. (*Dodd*) (3 ♂) (South Australian Museum) ; N. Territory, Grove Hill (——) (1 ♂) (South Australian Museum) ; SOLOMON IS. : Guadalcanal, Honiara distr., Kukum, 1954–56 (*Brown*) (6 ♂) ; Guadalcanal, Honiara distr., Tenaru, 1954–56 (*Brown*) (9 ♂, 3 ♀) ; Guadalcanal, Poha River, 22.viii.1954 (*Brown*) (1 ♀) ; Guadalcanal, Rua Vatu, 18.viii.1955 (*Brown*) (1 ♂) ; Buin, 23.vii.1922 (*Armytage*) (1 ♂).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text-fig. 2). *D. japonica* (Thunberg) ranges over the whole of Asia south of latitude 40° N. and east of longitude 70° E. It is found throughout Indonesia, extending eastwards to the Solomon Is. and southwards to northern Australia.

2. *Ducetia furcata* sp. n.

Holotype ♂, FORMOSA : Takao, 17.viii.1907 (*Sauter*). In the Naturhistorisches Museum, Vienna.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 52, R_s bifurcate. Cerci as in Text-fig. 31, without interno-ventral ridge at apex. Subgenital plate as in Text-fig. 4.

♀. Venation of fore wings as in Text-fig. 80.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae. Fore coxae with very small spine. Fore femora with about 4–11 external spinules. Mid femora with about 11–14 external spinules. Hind femora with terminal dorsal point and with about 9–11 external spinules. Hind tibiae with about 55–100 external dorsal spines. Venation of fore wings as in Text-fig. 52, R_s bifurcate. Hind wings extending beyond fore wings by between fifth and sixth length of latter.

Tenth abdominal tergite enlarged. Supra-anal plate slightly longer than broad, ligulate. Cerci as in Text-fig. 31, without interno-ventral ridge at apex. Subgenital plate as in Text-fig. 4.

Coloration green, with dark brown markings on vertex, antennae, pronotal disc, stridulatory organ, hind margin of fore wings, and parts of legs. Cerci with dark tip.

♀. As male except for wings and genitalia. Venation of fore wings as in Text-fig. 80. Hind wings extending beyond fore wings by about tenth length of latter. Ovipositor crenulate along distal two-thirds of dorsal margin and distal third of ventral margin.

MEASUREMENTS

Males

Total length (4) : 34·6–36·4, mean 35·50.
Median length of pronotum (4) : 4·2–4·4, mean 4·27.
Length of hind femur (4) : 23·4–25·7, mean 24·12.
Length of fore wing (4) : 25·3–26·4, mean 25·95.

Females

Total length (1) : 33·4.
Median length of pronotum (2) : 4·7–4·9, mean 4·80.
Length of hind femur (1) : 25·8.
Length of fore wing (2) : 24·5–25·8, mean 25·15.
Length of ovipositor (2) : 6·6–6·8, mean 6·70.

VARIATION. The femoral and tibial spines and spinules vary greatly in number.

DISCUSSION. In its size and general appearance this species resembles *D. japonica* (Thunberg) ; it may be distinguished from it, however, by the bifurcate R_s and, in the male, by the lack of an interno-ventral ridge at the apex of the cerci.

MATERIAL EXAMINED

♂ holotype ; 1 ♂ and 1 ♀ paratype, FORMOSA : Takao, 11.viii.1907 (*Sauter*) (♂ in British Museum (Natural History), ♀ in Nat. Mus. Vienna) ; 1 ♂ paratype, FORMOSA : Takao, 30.vii.1907 (*Sauter*) (Nat. Mus. Vienna) ; 1 ♂ paratype, FORMOSA : Takao (*Sauter*) (Nat. Mus. Vienna).

FORMOSA : —— (*Hilgendorf*) (1 ♀) (Zool. Mus. Berlin).

DISTRIBUTION. Known only from Formosa.

3. **Ducetia javanica** (Brunner, 1891) comb. n.

Isotima javanica Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 54. Lectotype ♂, Java: Tengger Mts. (*Fruhstorfer*). 2 ♂ and 2 ♀ syntypes, same data as lectotype; 1 ♀ syntype, Java (*Dohrn*). In the Naturhistorisches Museum, Vienna.

Diagnosis. ♂. Hind wings rudimentary. Venation of fore wings as in Text-fig. 53. Cerci as in Text-fig. 32. Subgenital plate as in Text-fig. 5.

♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 81.

Measurements

Males

Total length (6): 16·4–19·8, mean 18·53.
Median length of pronotum (6): 2·6–3·3, mean 3·07.
Length of hind femur (5): 12·1–14·7, mean 13·82.
Length of fore wing (6): 13·2–15·1, mean 14·22.

Females

Total length (3): 23·7–24·6, mean 24·17.
Median length of pronotum (3): 3·2–3·6, mean 3·38.
Length of hind femur (3): 15·2–16·0, mean 15·67.
Length of fore wing (3): 18·6–19·4, mean 18·93.
Length of ovipositor (3): 4·8–5·0, mean 4·91.

Discussion. This species is evidently a brachypterous derivative from *D. japonica* (Thunberg), which it closely resembles in every feature except the development of the wings and size.

I have selected and marked a male lectotype from among the syntypes of this species; this specimen bears the number 18.170.

Material examined

♂ lectotype, 2 ♂ syntypes, and 3 ♀ syntypes.

Java: Mt. Tengger, Nongkadjadjar, 1,100 m., v.1938 (*Walsh*) (3 ♂) (Zool. Inst. Lund).

Distribution. Known only from the Tengger Mountains.

4. **Ducetia cruciata** Brunner, 1891

Ducetia cruciata Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 53. Lectotype ♂, Indo-China: Cambodia (*Rosset*). 1 ♂ and 1 ♀ syntype, same data as lectotype. In the Naturhistorisches Museum, Vienna.

Diagnosis. ♂. Venation of fore wings as in Text-fig. 54, R with 5 parallel posterior branches. Cerci as in Text-fig. 33. Subgenital plate as in Text-fig. 6.

♀. Subgenital plate with posteriorly directed process on each side, as in Text-fig. 78. Venation of fore wings as in Text-fig. 82.

MEASUREMENTS

Males

Total length (3): 37·4–44·1, mean 39·90.
Median length of pronotum (3): 3·9–5·0, mean 4·51.
Length of hind femur (4): 18·7–27·4, mean 23·30.
Length of fore wing (4): 21·4–34·4, mean 29·32.

Females

Total length (2): 40·9–47·3, mean 44·10.
Median length of pronotum (3): 4·4–4·8, mean 4·57.
Length of hind femur (3): 25·4–28·5, mean 27·97.
Length of fore wing (2): 31·5–35·4, mean 33·45.
Length of ovipositor (2): 5·3–5·6, mean 5·45.

DISCUSSION. This species has a similar wing-venation to *D. japonica* (Thunberg), but may be distinguished from it by the genitalia and larger size.

I have selected and marked a male lectotype from among the syntypes of this species; this specimen bears the number 17.099.

MATERIAL EXAMINED

♂ lectotype, ♂ syntype, and ♀ syntype.

BURMA: Toungoo (*Crumb*) (2 ♂, 2 ♀) (1 ♂ in British Museum (Natural History); remainder in Academy of Natural Sciences of Philadelphia).

DISTRIBUTION. This species is known only from Indo-China and Burma, but doubtless also occurs in Thailand.

5. ***Ducetia ceylanica*** Brunner, 1878

Ducetia ceylanica Brunner, 1878, Monographie der Phaneropteriden, p. 111. Holotype ♂, CEYLON (*Nietner* (?)). In the Zoologisches Museum of the Humboldt-Universität, Berlin.

DIAGNOSIS. ♂♀. Venation of fore wings as in Text-figs. 55 and 83, R with 3 or 4 posterior branches. Pronotum selliform. Supra-anal plate large and apparently fused to tenth abdominal tergite (male as in Text-fig. 91). Male cerci as in Text-fig. 34. Male subgenital plate as in Text-fig. 7.

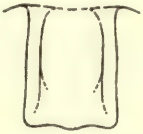

FIG. 91. Dorsal view of the male supra-anal plate of *D. ceylanica* Brunner.

MEASUREMENTS

Male

Total length (2) : 53·8–54·8, mean 54·30.
Median length of pronotum (2) : 5·8–5·8, mean 5·80.
Length of hind femur (2) : 26·2–28·3, mean 27·25.
Length of fore wing (2) : 42·2–44·1, mean 43·15.

Female

Total length : 36·2.
Median length of pronotum : 5·5.
Length of hind femur : 26·9.
Length of fore wing : 30·5.
Length of ovipositor : 6·7.

DISCUSSION. This species may be easily recognized by the very prominent supra-anal plate and the large, broad, male fore wings.

MATERIAL EXAMINED

♂ holotype.

CEYLON : Hakgalla, iii.1924 (——) (1 ♂) ; Woodside, Urugalla, 11.ix.1922 (——) (1 ♀). Both in the British Museum (Natural History).

DISTRIBUTION. Known only from Ceylon.

6. ***Ducetia chinensis*** (Brunner, 1878) comb. n.

Isotima chinensis Brunner, 1878, Monographie der Phaneropteriden, p. 113. Holotype ♀, CHINA. Probably destroyed.

Kuwayamaea sapporensis Matsumura & Shiraki, 1908, *J. Coll. Agric. Tokyo*, **3** : 8. 2 ♂ syntypes and 2 ♀ syntypes, JAPAN : Sapporo and Josankei, ix (*Kuwayama*). In the collection of S. Matsumura. ***Syn. n.***

Kuwayamaea yezoensis Matsumura, 1913, Thousand insects of Japan. Additamenta 1, p. 30. ? Nom. n. for *K. sapporensis* Matsumura & Shiraki.

Anisotima chinensis (Brunner), Bei-Bienko, 1954, *Fauna Rossii* (New Series), Orthoptera, **2** (2) : 88.

Kuwayamaea chinensis (Brunner), Bei-Bienko, 1955, *Zool. Zh.* **34** : 1252.

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 8 and 24, with two inwardly-directed apical teeth. Cerci as in Text-fig. 35. Venation of fore wings as in Text-fig. 56.

♀. Hind wings not extending beyond tips of flexed fore wings, but not rudimentary. Venation of fore wings as in Text-fig. 84.

MEASUREMENTS

Male

Total length (5) : 30·3–35·0, mean 33·42.
Median length of pronotum (3) : 3·9–4·4, mean 4·23.
Length of hind femur (5) : 21·5–23·8, mean 22·92.
Length of fore wing (6) : 22·5–25·0, mean 23·72.

Females

Total length (2) : 30·0–32·2, mean 31·10.
Median length of pronotum (2) : 4·6–5·3, mean 4·95.
Length of hind femur (2) : 21·7–26·2, mean 23·95.
Length of fore wing (2) : 23·3–25·0, mean 24·15.
Length of ovipositor (2) : 7·2–8·2, mean 7·70.

DISCUSSION. Males of this species may be easily recognized by the very characteristic subgenital plate (Text.-fig. 24), and females by their somewhat reduced, though not rudimentary, hind wings.

The female holotype of this species was stated by Brunner (1878) to be in Budapest (presumably in the Magyar Nemzeti Múseum) and is doubtless now destroyed. The four syntypes of *Kuwayamaea sapporensis* Matsumura & Shiraki were in Matsumura's collection and may now be in the Entomological Museum of Hokkaido University, but I have been unable to obtain these specimens or even to confirm their whereabouts. However, Dr. Asahina has very kindly sent me two male specimens of *K. sapporensis* Matsumura & Shiraki, one of which is from Ōnuma, not far from Jozankei and Sapporo, the type localities. I have further, through the courtesy of Professor G. Ya. Bei-Bienko and Dr. L. Mistshenko, been able to examine a specimen of each sex of *D. chinensis* (Brunner) from the " type locality ", China. An examination of these specimens, and of four further specimens from Manchuria, Korea, and the Russian Far East, has convinced me that all belong to the same species. Such small differences as are apparent are not, in my opinion, of taxonomic value at the specific level. The female from the Russian Far East differs from the one from China in having a smaller ovipositor and relatively shorter hind wings ; it is possible that further material will show this difference to be a geographical one.

MATERIAL EXAMINED

CHINA : Kiangsu, Ihing, 9.viii.1933 (*Piel*) (1 ♀) (Zool. Inst. Leningrad) ; Nanking, 9.x.1942 (——) (1 ♂) (Zool. Inst. Leningrad) ; Manchuria, nr. Lake Hanka, 1900 (*Bohnhof*) (1 ♂) (Mus. Hist. Nat. Paris) ; U.S.S.R. : Ussuri, Spasski, Yakoulevka, 23.viii.1926 (*Diakonov & Philippiev*) (1 ♀) (Zool. Inst. Leningrad) ; KOREA : Quelpart I., S. Ichikawa, in grass, 1.ix.1905 (——) (1 ♂) ; JAPAN : Hokkaido, Ōnuma, 19.vii.1937 (*Asahina*) (1 ♂) ; Tokyo, Mt. Takao, 4.viii.1929 (*Asahina*) (1 ♂) ; KURIL Is. : Sikotan, nr. Akama, 9.ix.1949 (*Strelkov*) (1 ♂) (Zool. Inst. Leningrad).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text.-fig. 2). The range of this species corresponds approximately to Wallace's Manchurian Sub-region.

7. **Ducetia spatula** sp. n.

Holotype ♂, INDO-CHINA : South Vietnam, Phanrang Prov., nr. Ca-Na, 700–900 m., 1923 (*Poilane*). In the Muséum National d'Histoire Naturelle, Paris.

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 9 and 26. Cerci as in Text-fig. 36, spatulate apically. Venation of fore wings as in Text-fig. 57.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above. Pronotum without lateral carinae. Fore coxae with small spine. Fore femora with about 2–3 external spinules. Mid femora with about 8 external spinules. Hind femora with about 4 external spinules; terminal dorsal spine absent. Hind tibiae with about 45 external dorsal spinules. Venation of fore wings as in Text-fig. 57. Hind wings extending beyond fore wings by about quarter length of latter.

Tenth abdominal tergite emarginate posteriorly. Supra-anal plate triangular. Cerci as in Text-fig. 36, spatulate with dorsal and ventral ridge apically. Subgenital plate as in Text-figs. 9 and 26.

Coloration green, with brown markings on vertex, pronotal disc, and stridulatory organ. Apical ridges of cerci darkened.

♀ unknown.

MEASUREMENTS

Male

Total length: 31·7.
Median length of pronotum: 3·6.
Length of hind femur: 20·2.
Length of fore wing: 21·9.

DISCUSSION. This species may be recognized by the male genitalia.

MATERIAL EXAMINED

The holotype is unique.

8. *Ducetia crosskeyi* sp. n.

Holotype ♂, NIGERIA: Niger Province, Diko, in house, 9.xii.1958 (*Crosskey*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Subgenital plate as in Text-figs. 10, 25 and 27, with two inwardly-directed apical teeth. Cerci as in Text-fig. 37. Venation of fore wings as in Text-fig. 58.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex long, compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with well-developed humeral sinus. Fore coxae unarmed. Femora unarmed. Fore tibiae with about 5–7 external ventral spurs. Mid tibiae with about 10–11 external ventral spurs. Hind femora without terminal dorsal spine. Hind tibiae with about 60–70 external dorsal spines. Venation of fore wings as in Text-fig. 58. Hind wings extending beyond fore wings by just under third length of latter.

Tenth abdominal tergite much enlarged. Supra-anal plate small, rounded posteriorly. Cerci as in Text-fig. 37. Subgenital plate as in Text-figs. 10, 25, and 27, with two inwardly-directed apical teeth.

Coloration brown above, mainly green elsewhere. Legs largely brown, but often green basally. Fore wings (and, less often, exposed part of hind wings) usually with some dark brown spots. Cerci darkened towards tip.

♀ unknown.

MEASUREMENTS

Males

Total length (9) : 29·1–32·6, mean 30·70.
Median length of pronotum (10) : 3·3–3·6, mean 3·43.
Length of hind femur (9) : 18·4–20·9, mean 19·38.
Length of fore wing (10) : 20·1–22·0, mean 21·02.

VARIATION. The tibial spurs and spines vary a little in number. The arrangement of the radial branches in the fore wing is often irregular ; when arranged in a normal pectinate fashion, they are usually four in number. There is considerable variation in the shape of the apical part of the cerci : it is three-edged in the holotype (and therefore triangular in cross-section) but is flat and two-edged in some of the other specimens. It is probable that this variation will prove to be of a geographical nature when more material becomes available.

DISCUSSION. This species may be easily diagnosed by the male genitalia. The subgenital plate has two inwardly-directed teeth of the type shown by *D. chinensis* (Brunner), but the two species differ widely in all other respects.

MATERIAL EXAMINED

♂ holotype ; 1 ♂ paratype, NIGERIA : Niger Province, Diko, in house, 6.xii.1958 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Niger Province, Diko, 12–15.xii.1958 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Niger Province, Diko, nr. Abuja, at light, iv–x.1956 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Niger Province, Minna, at light, vii.1956 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Katsina Province, Kankiya, at light, x.1956 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Zaria Province, Kaduna, at light, viii.1955 (*Crosskey*) ; 1 ♂ paratype, NIGERIA : Ibadan, at light, vi.1956 (*Eastop*).

GHANA : Yeji, Volta R., at light, 15.xi.1926 (——) (1 ♂) ; FRENCH EQUATORIAL AFRICA : Ubangi, x.1910 (*Talbot*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION (Text-fig. 2). Doubtless widespread in West Africa.

9. ***Ducetia loosi*** Griffini, 1908

Ducetia loosi Griffini, 1908, *Mém. Soc. ent. Belg.* **15** : 204. Holotype ♀, BELGIAN CONGO : Popocabacca (*Loos*). In the Institut Royal des Sciences Naturelles de Belgique, Brussels.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 59, R with about 5 posterior branches. Subgenital plate as in Text-figs. 11 and 28. Cerci as in Text-fig. 38.

♀. Venation of fore wings as in Text-fig. 85.

MEASUREMENTS

Males

Total length (11) : 45·8–49·8, mean 47·35.
Median length of pronotum (13) : 4·4–4·9, mean 4·55.
Length of hind femur (9) : 26·3–30·7, mean 28·08.
Length of fore wing (13) : 32·5–34·9, mean 33·37.

Females

Total length (5) : 46·4–48·2, mean 47·54.
Median length of pronotum (11) : 4·3–4·9, mean 4·60.
Length of hind femur (9) : 24·7–28·6, mean 26·70.
Length of fore wing (7) : 32·2–34·8, mean 33·74.
Length of ovipositor (11) : 7·3–8·2, mean 7·62.

DISCUSSION. This species and *D. fuscopunctata* Chopard, which may be only subspecifically distinct (see the discussion of *D. fuscopunctata* Chopard, p. 195), are the largest African members of the genus, having fore wings usually more than 30 mm. long. Males of *D. loosi* Griffini may be distinguished from this sex of *D. fuscopunctata* Chopard by the shape of the subgenital plate. Both species occur in two principal colour varieties, one of which is all brown, and the other green in the female and green with brown and orange dorsum in the male.

MATERIAL EXAMINED

♀ holotype.

BELGIAN CONGO : Eala, 1935–36 (*Ghesquière*) (10 ♂, 3 ♀) (Mus. Congo Belge) ; Bambesa, 24.iii.1932 (*Vrydagh*) (1 ♀) (Mus. Congo Belge) ; Bambesa, 10.iv.1937 (*Vrydagh*) (1 ♀) (Mus. Congo Belge) ; Bafwarikubi, 12.ix.1912 (*Christy*) (1 ♂) (Mus. Congo Belge) ; Kunungu, Réc. Nkele, 1932 (*Schouteden*) (1 ♂) (Mus. Congo Belge) ; Tshuapa, Bokungu, 1949 (*Dupuis*) (1 ♂) (Mus. Congo Belge) ; Yambata, ii–iii.1914 (*De Giorgi*) (1 ♀) (Mus. Congo Belge) ; Urundi, Bitare, Kitega, 16–20.ii.1950 (*Laurent*) (1 ♀) (Mus. Congo Belge) ; Kwango, Kiniati-Yasa, 2.x.1952 (*Ruelle*) (1 ♀) (Mus. Congo Belge) ; Kivu, Masisi, 1938 (*Le Moult*) (3 ♀) (Zool. Inst. Lund) ; UGANDA : Tero Forest, vii.1912 (*Gowdey*) (1 ♂) (British Museum (Natural History)).

DISTRIBUTION (Text-fig. 2). *D. loosi* Griffini probably covers most of the more humid parts of Equatorial Africa.

10. ***Ducetia fuscopunctata*** Chopard, 1954

Ducetia fuscopunctata Chopard, 1954, La réserve naturelle intégrale du Mont Nimba. Fasc. II. Pt. III. Orthoptères Ensifères. *Mém. Inst. franç. Afr. noire*, **40** (2) : 35. Holotype ♂, GUINEA : Nimba, Yalanzou, ii–vi.1942 (*Lamotte*). In the Muséum National d'Histoire Naturelle, Paris.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 60, R with 4–5 posterior branches. Subgenital plate as in Text-figs. 12 and 29. Cerci as in Text-fig. 39.

♀. Venation of fore wings as in Text-fig. 86.

MEASUREMENTS

Males

Total length (7) : 44·3–50·4, mean 47·37.
Median length of pronotum (7) : 4·3–4·9, mean 4·62.
Length of hind femur (7) : 26·3–29·0, mean 27·71.
Length of fore wing (6) : 29·5–35·4, mean 32·82.

Females

Total length (1) : 44·3.
Median length of pronotum (2) : 4·6–4·8, mean 4·70.
Length of hind femur (1) : 27·2.
Length of fore wing (2) : 30·7–33·0, mean 31·85.
Length of ovipositor (1) : 6·9.

DISCUSSION. It is probable that this species represents a western subspecies of *D. loosi* Griffini, which it resembles closely in all features except the shape of the apical part of the male subgenital plate. The male specimens from Ghana have a narrower stridulatory organ and a markedly swollen base to the media in the fore wings, when compared with the holotype and specimens from Sierra Leone, and it is probable that this will be best regarded as another subspecific distinction when more material is available. No specimens are as yet forthcoming from Nigeria, where it is very likely that this species also occurs ; possibly such material would be intermediate between *D. fuscopunctata* Chopard and *D. loosi* Griffini in the shape of the male subgenital plate.

D. fuscopunctata Chopard shows the same two principal colour varieties as those found in *D. loosi* Griffini.

MATERIAL EXAMINED

♂ holotype.

SIERRA LEONE : Njala, 27.vii.1928 (*Hargreaves*) (1 ♂) ; Njala, 17.xii.1930 (*Hargreaves*) (1 ♂) ; GUINEA : Nimba Mts., vi.1951 (*Holas*) (1 ♂) (Institut Français d'Afrique Noire, Dakar) ; Nimba Mts., Ziéla, ix.1956 (*Lamotte*) (1 ♀) (Institut Français d'Afrique Noire, Dakar) ; GHANA : Tafo, at light, v.1957 (*Eastop*) (2 ♂) ; Tafo, v–vi.1954 (*Williams*) (1 ♂) ; Aburi, 1912–13 (*Patterson*) (1 ♂) ; FRENCH WEST AFRICA : Togo, Misahöhe, v–vi.1894 (*Baumann*) (1 ♂, 1 ♀) (Zool. Mus. Berlin).

In the British Museum (Natural History) unless otherwise stated.

DISTRIBUTION (Text-fig. 2). This species is known only from French West Africa (including Guinea), Sierra Leone, and Ghana, but probably also occurs in Nigeria.

11. ***Ducetia macrocerca*** sp. n.

Holotype ♂, BELGIAN CONGO : Katanga, Kiambi, 20.ii.1911 (*Valdonio*). In the Musée Royal du Congo Belge, Tervuren.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 61, R with 3–4 posterior branches. Cerci long, shaped as in Text-fig. 40. Subgenital plate as in Text-fig. 13. ♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex sloping steeply to frons, compressed, sulcate above.

Pronotum without lateral carinae; lateral lobes with moderately developed humeral sinus. Fore coxae unarmed. Fore femora with about 9 external spinules. Mid femora with about 15–18 external spinules. Hind femora with about 14 external ventral spinules; terminal dorsal spine absent. Hind tibiae with about 60–70 external dorsal spinules. Venation of fore wings as in Text-fig. 61, R with 3–4 posterior branches; cross-veins of area R arranged in closely parallel fashion from base of wing to first radial branch. Hind wings extending beyond fore wings by about third length of latter.

Tenth abdominal tergite enlarged, emarginate posteriorly. Supra-anal plate long, ligulate. Cerci long, shaped as in Text-fig. 40. Subgenital plate as in Text-fig. 13.

Coloration reddish above, mainly green elsewhere. Antennae, femora, and fore tibiae, partly reddish; mid and hind tibiae brown. Femoral spinules darkened. Tibial spines with dark tip. Fore wings and exposed part of hind wings with some dark brown spots. Cerci darkened towards tip.

♀ unknown.

MEASUREMENTS

Male

Total length: 39·5.
Median length of pronotum: 4·4.
Length of hind femur: 23·4.
Length of fore wing: 26·5.

DISCUSSION. The relatively long cerci, and the very elongate subgenital plate, with its slender lobes, enable the male of this species to be easily diagnosed.

MATERIAL EXAMINED

The holotype is unique.

12. ***Ducetia costata*** sp. n.

Holotype ♂, BELGIAN CONGO: Nyangwe, iv–v.1918 (*Mayné*). In the Musée Royal du Congo Belge, Tervuren.

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 62, R with 5 very prominent posterior branches. Cerci as in Text-fig. 41. Subgenital plate as in Text-fig. 14. ♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae. Fore coxae unarmed. Fore femora with about 2–3 external spinules. Mid femora with about 8 external spinules. Hind femora unarmed or with about 1 or 2 ventral spinules ; terminal dorsal spine absent. Hind tibiae with about 40–50 external dorsal spines. Venation of fore wings as in Text-fig. 62, R with 5 very prominent posterior branches. Hind wings extending beyond fore wings by half length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate longer than broad. Cerci as in Text-fig. 41. Subgenital plate as in Text-fig. 14.

Coloration probably green, with reddish markings on vertex, antennae, disc of pronotum, parts of legs, and stridulatory organ. Femoral spinules conspicuously black. Tibial spines with black tip. Cerci darkened towards tip.

♀ unknown.

MEASUREMENTS

Male

Total length : 29·6.
Median length of pronotum : 3·1.
Length of hind femur : 18·2.
Length of fore wing : 17·0.

DISCUSSION. The very proximal position of the first branch of the radius in the fore wing is found elsewhere in the genus only in *D. ramulosa* sp. n., which differs widely from the present species in the shape of the male cerci.

MATERIAL EXAMINED

The holotype is unique.

13. ***Ducetia chelocerca*** sp. n.

Holotype ♂, SOUTH AFRICA : Transvaal, junction of Crocodile and Marico Rivers, ii.1918 (*Tucker*). In the South African Museum, Cape Town.

DIAGNOSIS. ♂. Cerci as in Text-fig. 42. Subgenital plate as in Text-fig. 15. Venation of fore wings as in Text-fig. 63 ; R with 2–4 branches, often arranged in rather irregular fashion.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above. Pronotum without lateral carinae ; humeral sinus of lateral lobes indistinct or absent. Fore coxae unarmed. Fore femora with about 0–3 external spinules. Mid femora with about 7–9 external spinules. Hind femora with about 5–9 external spinules ; terminal dorsal spine absent. Hind tibiae with about 55–70 external dorsal spines. Venation of fore wings as in Text-fig. 63 ; R with 2–4 branches, often arranged in rather irregular fashion. Hind wings extending beyond fore wings by about fifth length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate quadrate. Cerci as in Text-fig. 42. Subgenital plate as in Text-fig. 15.

Coloration green, with red-brown or brown markings on vertex, antennae, and stridulatory organ. Femoral spinules and tibial spines with dark tips. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

Males

Total length (3) : 30·5–30·9, mean 30·63.
Median length of pronotum (3) : 3·2–3·4, mean 3·27.
Length of hind femur (2) : 21·8–22·1, mean 21·95.
Length of fore wing (3) : 21·7–22·4, mean 21·97.

VARIATION. The femoral spinules and tibial spines vary in number. The radial branches in the fore wing tend to be arranged irregularly ; their number and position differed considerably in the three specimens examined.

DISCUSSION. This species may be easily recognized by the male genitalia. Together with *D. parva* sp. n., this species has a less deeply bilobed subgenital plate than any other African species of the genus.

MATERIAL EXAMINED

♂ holotype ; 2 ♂ paratypes, same data as holotype (1 in S.A. Mus. Cape Town ; 1 in British Museum (Natural History)).

DISTRIBUTION. Known only from the type locality.

14. ***Ducetia ramulosa*** sp. n.

Holotype ♂, NORTHERN RHODESIA : Luano Valley, R. Mulungushi, 16–17.i.1928 (*Burr*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 64, R usually with 6 prominent posterior branches. Cerci as in Text-fig. 43. Subgenital plate as in Text-fig. 16.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex sloping steeply to frons, compressed, sulcate above.

Pronotum without lateral carinae ; lateral lobes with distinct humeral sinus. Fore coxae unarmed. Fore femora with about 4–7 external spinules. Mid femora with about 9–10 external spinules. Hind femora unarmed or with about 1–2 ventral spinules ; terminal dorsal spine absent. Hind tibiae with about 60 external dorsal spines. Venation of fore wings as in Text-fig. 64, R usually with 6 prominent posterior branches. Hind wings extending beyond fore wings by about half length of latter.

Tenth abdominal tergite enlarged. Supra-anal plate triangular. Cerci as in Text-fig. 43. Subgenital plate as in Text-fig. 16.

Coloration green, with red-brown markings, on vertex, antennae, pronotal disc, stridulatory organ, and posterior margin of fore wings. Sides of thorax, parts of legs, and abdominal tergites, with reddish spots. Femoral spinules black. Tibial spines with black tip. Fore wings with few brown spots. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

Males

Total length (2) : 35·8–35·8, mean 35·80.
Median length of pronotum (2) : 3·4–3·5, mean 3·45.
Length of hind femur (2) : 20·0–21·6, mean 20·80.
Length of fore wing (2) : 21·5–21·7, mean 21·60.

VARIATION. From the two specimens available it is clear that the femoral spinules vary greatly in number. In the paratype the two most proximal branches of the radius in the right fore wing have a short common stem, so that strictly R has five posterior branches in this wing, the first one dividing again.

DISCUSSION. The radius of the fore wing of this species has more posterior branches than any other member of the genus, except for abnormal specimens of *D. japonica* (Thunberg).

MATERIAL EXAMINED

♂ holotype ; 1 ♂ paratype, same data and depository as holotype.

DISTRIBUTION. Known only from the type locality.

15. ***Ducetia sagitta*** sp. n.

Holotype ♂, ANGOLA : Lepi, 390 km. from coast, 3,500 ft. (*Robins*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Cerci as in Text-fig. 44. Subgenital plate as in Text-fig. 17. Venation of fore wings as in Text-fig. 65, R with 4–5 posterior branches.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above. Pronotum without lateral carinae ; humeral sinus of lateral lobes rather indistinct. Fore coxae unarmed. Fore femora with about 3–5 external spinules. Mid femora with about 8–13 external spinules. Hind femora with variable number of ventral spinules or unarmed ; terminal dorsal spine absent. Hind tibiae with about 45–60 external dorsal spines. Venation of fore wings as in Text-fig. 65, R with 4–5 posterior branches. Hind wings extending beyond fore wings by slightly more than third length of latter.

Tenth abdominal tergite enlarged, its posterior margin smoothly convex. Supra-anal plate simply ligulate or bilobed apically. Cerci as in Text-fig. 44. Subgenital plate as in Text-fig. 17.

General coloration green. Vertex and antennae with brown markings. Pronotum with dark spot on each side of anterior part of disc, in centre of disc, on humeral sinus, and sometimes elsewhere. Femoral spinules sometimes darkened. Tibiae sometimes brown. Tibial spines with dark tip. Stridulatory organ and posterior margin of fore wings more or less brown. Fore wings sometimes with dark spots. Cerci darkened at tip.

♀ unknown.

MEASUREMENTS

Males

Total length (5) : 32·1–40·7, mean 36·36.
Median length of pronotum (5) : 3·4–4·4, mean 3·76.
Length of hind femur (5) : 19·6–24·2, mean 21·58.
Length of fore wing (4) : 22·4–25·7, mean 24·02.

VARIATION. The femoral spinules and tibial spines vary in number. In the two specimens from South West Africa the hind femora were quite unarmed, though these limbs bore 8–12 external ventral spinules in the three Angolan specimens. The shape of the supra-anal plate varies from being long and rather pointed apically (northern specimens) to being shorter and truncate or even bilobed (southern specimens). The cerci also vary in shape, and the material available suggests that this variation is again of a geographical nature. The brown components of the coloration were much more marked in the two most northerly specimens than in the remaining three.

DISCUSSION. This species is characterized by the shape of the male cerci.

MATERIAL EXAMINED

♂ holotype ; 1 ♂ paratype, ANGOLA : Huambo, viii. 1934 (Pimentel) (British Museum (Natural History)).

ANGOLA : Namakunde, ii. 1923 (——) (1 ♂) (S.A. Mus. Cape Town) ; SOUTH WEST AFRICA : Otjiverongo, iv. 1951 (*Brown*) (1 ♂) (British Museum (Natural History)) ; Narebis, iii. 1921 (*Barnard*) (1 ♂) (S.A. Mus. Cape Town).

DISTRIBUTION (Text-fig. 2). Known only from western Angola and South West Africa.

16. ***Ducetia biramosa*** (Karsch, 1888) comb. n.

Paura biramosa Karsch, 1888, *Berl. ent. Z.* **32** : 439. Holotype ♀, TANGANYIKA : Usambara, ii–iii, 1886 (*Schmidt*). In the Zoologisches Museum of the Humboldt-Universität, Berlin.
Isotima biramosa (Karsch), Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 54.

DIAGNOSIS. ♂. Cerci gradually tapering to slender point, as in Text-fig. 45. Venation of fore wings as in Text-fig. 66, R with 3–4 posterior branches. Subgenital plate as in Text-fig. 18.

♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 87. Ovipositor as in Text-fig. 73.

DESCRIPTION OF ♂. Fastigium of vertex compressed, sulcate above.

Pronotum without lateral carinae ; lateral lobes with moderately developed humeral sinus. Fore coxae unarmed. Fore femora with about 1–3 external spinules. Mid femora with about 13–17 external spinules. Hind femora with about 9–13 external spinules ; terminal dorsal spine absent. Hind tibiae with about 60–70 external dorsal spines. Venation of fore wings as in Text-fig. 66 ; R with

3–4 posterior branches, sometimes rather irregular in their arrangement. Hind wings extending beyond fore wings by between quarter and fifth length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate triangular. Cerci gradually tapering to slender point, as in Text-fig. 45. Subgenital plate as in Text-fig. 18.

General coloration green. Fastigium of vertex brown above. Pronotum with dark brown spots on each side of anterior and posterior part of disc. Hind tibiae mostly or entirely brown. Femoral spinules, tibial spines, and cerci, with dark tip. Stridulatory organ with brown markings. Posterior margin of fore wings sometimes brown. Fore wings with few dark brown spots.

MEASUREMENTS

Males

Total length (2) : 33·2–34·4, mean 33·80.
Median length of pronotum (2) : 3·7–3·9, mean 3·80.
Length of hind femur (2) : 23·4–24·4, mean 23·90.
Length of fore wing (2) : 24·0–24·4, mean 24·20.

Females

Total length (2) : 25·1–29·1, mean 27·10.
Median length of pronotum (2) : 4·5–4·6, mean 4·55.
Length of hind femur (2) : 21·6–22·1, mean 21·85.
Length of fore wing (2) : 21·5–23·5, mean 22·50.
Length of ovipositor (2) : 7·5–7·8, mean 7·65.

DISCUSSION. This species, in common with *D. punctipennis* (Gerstaecker) (and probably most of the other East African species of the genus), shows marked sexual dimorphism. Until the present time, the female has been known as *Paura biramosa* Karsch, and its association with *Ducetia* Stål has been unsuspected (see p. 172). Careful comparison with the holotype and with the other female listed below leaves little doubt that the two males, which clearly belong to *Ducetia* Stål, are conspecific with them, and a description of the male sex is given above.

The male may be diagnosed by the genitalia, especially the shape of the cerci, and the fore wings, which are relatively broader than those of any of the other African members of the genus. The female may be distinguished from *D. punctipennis* (Gerstaecker) by its longer, more pointed, fore wings.

MATERIAL EXAMINED

♀ holotype.

TANGANYIKA : Dar-es-Salaam, iv.1924 (*Cutler*) (1 ♂) ; Morogoro, on cotton, v.1931 (*Agric. Dept. Ent. Lab.*) (1 ♂) ; Kilosa, 21.iii.1922 (*Loveridge*) (1 ♀).

All in the British Museum (Natural History).

DISTRIBUTION. Known only from eastern Tanganyika.

17. ***Ducetia punctipennis*** (Gerstaecker, 1869)

Phaneroptera punctipennis Gerstaecker, 1869, *Arch. Naturgesch.* **35** (1) : 215. Holotype ♂, KENYA : Mt. Ndara, xii. 1862 (*Kersten, on von der Decken's Exp.*). In the Zoologisches Museum of the Humboldt-Universität, Berlin.

Paura reticulosa Karsch, *Berl. ent. Z.* **32** : 440. Holotype ♀, KENYA : Mombasa, xii. 1876 (*Hildebrandt*). In the Zoologisches Museum of the Humboldt-Universität, Berlin. ***Syn. n.***

Isotima reticulosa (Karsch), Brunner, 1891, Additamenta zur Monographie der Phaneropteriden, p. 55.

Telaea quadripunctata Bolivar, 1922, *Voy. M. Rothschild E. Afr. Anim. Art.* **1** : 201. Holotype ♂, KENYA : Simba. Lost. ***Syn. n.***

DIAGNOSIS. ♂. Subgenital plate as in Text-fig. 19. Venation of fore wings as in Text-fig. 67, R with 3–6 posterior branches ; right fore wing with small transparent patch in basal region of areas R and MA. Cerci as in Text-fig. 46.

♀. Hind wings rudimentary. Venation of fore wings as in Text-fig. 88. Ovipositor as in Text-fig. 74.

MEASUREMENTS

Males

Total length (4) : 29·8–35·2, mean 31·80.
Median length of pronotum (4) : 3·2–3·5, mean 3·37.
Length of hind femur (4) : 20·2–24·0, mean 22·30.
Length of fore wing (4) : 20·0–22·7, mean 21·18.

Females

Total length (3) : 23·0–24·2, mean 23·77.
Median length of pronotum (3) : 4·1–4·8, mean 4·50.
Length of hind femur (2) : 20·8–21·6, mean 21·20.
Length of fore wing (3) : 18·6–19·6, mean 19·07.
Length of ovipositor (3) : 6·3–6·8, mean 6·54.

DISCUSSION. The transparent patch at the base of the right fore wing and the shape of the subgenital plate enable males of this species to be easily recognized. The fore wings of this sex tend to be shinier and more translucent and to have fewer radial branches in the more northerly parts of the range. The small brown spots which are present on the fore wings of specimens from southern Kenya are less evident in more northerly specimens and were quite lacking in the specimen from Somalia (except for two small spots at the base of the radial area of the right fore wing). The cerci of the specimen from Somalia were stouter and much less attenuate than those of the more southerly specimens.

As a result of kind investigations made by Drs. L. Chopard and E. Morales Agacino, it seems that the holotype of *Telaea quadripunctata* Bolivar is neither in Paris nor Madrid, and must be presumed to be lost. However, it is abundantly clear from the original description that this name is a synonym of *D. punctipennis* (Gerstaecker) ; the type localities of the two holotypes are close together in southern Kenya.

The females of this species are strikingly different from the males. The hind wings are rudimentary and the fore wings bear no resemblance to those of the opposite sex. As in the Acrometopae (see Ragge, 1960, p. 275) this sexual dimorphism also affects the vertex, pronotum, and hind legs. As a result of these intersexual differences the females of this species and *D. biramosa* (Karsch), when first discovered (Karsch, 1888), were used as the basis of a new genus, *Paura* Karsch (and new group Paurae!), which was considered by this author to be related to the Acridopezae, Eurypalpae, and Leptoderae, though he noted that the fore femora were of the type found in the Ducetiae. Brunner (1891, p. 54) synonymized this genus with *Isotima* Brunner, but Kirby (1906, p. 407) gave it separate status again. (It should be noted that Kirby listed *Paura* Karsch twice in his Catalogue, first (p. 399) as a synonym of *Isotima* Brunner and second (p. 407) as an independent genus; the first of these entries was unintentional, as shown by the page reference to it in the index being in square brackets.) Since that time the taxonomic status of *Paura* Karsch has not been further investigated.

The fact that the female sex was unknown in almost all the East African species of *Ducetia* Stål suggested that these species might show an unusual degree of sexual dimorphism, and that the females might, as a result, have been placed in a different genus. The genus *Paura* Karsch, based on females only, was an obvious possibility, and a careful comparison of the holotypes of the two species of *Paura* Karsch with males of *Ducetia* Stål from similar parts of East Africa has enabled the two sexes of these two species to be brought together. The male of *Paura reticulosa* Karsch proved to have been previously described as the present species and this name therefore becomes a synonym. The holotype of *Paura biramosa* Karsch, which differs from the female of the present species in having longer, more pointed, fore wings, has been associated with two males and a female from Tanganyika; this specific name remains valid (see p. 172).

MATERIAL EXAMINED

♂ holotype. ♀ holotype of *Paura reticulosa* Karsch.

KENYA: Mandera distr., Takabba, 03° 25′ N., 40° 12′ E., thorn-bush, 13.xii.1944 (*Kevan*) (1 ♂); Moyale distr., Yasere, 03° 30′ N., 38° 35′ E., thorn-bush, 14.vi.1946 (*Kevan*) (1 ♂); Mandera distr., Damassa, 03° 09′ N., 41° 20′ E., desert grass and thorn-bush, 17.xii.1944 (*Kevan*) (1 ♂); SOMALIA: Lugh-Ferrandi, 11.xi.1953 (*Popov*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION (Text-fig. 2). This species is probably distributed over most of the semi-desert area of eastern Africa.

18. ***Ducetia punctata*** (Schulthess, 1898) comb. n.

Pseudisotima punctata Schulthess, 1898, *Ann. Mus. Stor. nat. Genova*, **39**: 199. Holotype ♀, ETHIOPIA: Girma, viii.1893 (*Ruspoli*). In the Museo Civico di Storia Naturale, Genoa.

DIAGNOSIS. ♂. Hind wings rudimentary. Fore wings much reduced, their venation as in Text-fig. 68. Cerci as in Text-fig. 47. Subgenital plate as in Text-fig. 20.

♀. Hind wings rudimentary. Fore wings reduced to short lobes, their venation as in Text-fig. 89. Ovipositor as in Text-fig. 75.

MEASUREMENTS

Males

Total length (2) : 13·2–14·7, mean 13·95.
Median length of pronotum (2) : 3·3–3·8, mean 3·55.
Length of hind femur (1) : 17·8.
Length of fore wing (2) : 9·2–9·8, mean 9·50.

Female

Total length (to tip of fore wings) : 12·1.
Median length of pronotum : 4·0.
Length of hind femur : 19·0.
Length of fore wing : 6·7.
Length of ovipositor : 6·6.

DISCUSSION. This species has clearly been derived from *D. punctipennis* (Gerstaecker) by reduction of the wings, in much the same way as *D. javanica* (Brunner) has from *D. japonica* (Thunberg). The two species (*punctata* and *punctipennis*) are closely similar in most of their features, and, in spite of the wing-reduction, *D. punctata* (Schulthess) shows the same development of a transparent patch in the basal region of MA in the right male fore wing as is shown by *D. punctipennis* (Gerstaecker). The five dark spots on the disc of the pronotum are also common to the two species.

MATERIAL EXAMINED

KENYA : Moyale, open bush, 15.vi.1946 (*Kevan*) (2 ♂, 1 ♀) (British Museum (Natural History)).

DISTRIBUTION. Known only from the vicinity of the north-east frontier of Kenya.

19. ***Ducetia vitriala*** sp. n.

Holotype ♂, BRITISH SOMALILAND : Haud, 8° 28′ N., 45° 38′ E., 2,500 ft., night, 22.v.1932 (*Taylor*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Fore wings transparent and shiny, their venation as in Text-fig. 69 ; R with 2–4 posterior branches. Subgenital plate as in Text-fig. 21. Cerci as in Text-fig. 48.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex moderately compressed, sulcate above.

Pronotum without lateral carinae ; humeral sinus poorly developed or absent. Fore coxae unarmed. Fore femora with about 4–7 external spinules. Mid femora with about 8–13 external spinules. Hind femora with about 11–15 external spinules ; terminal dorsal spine absent. Hind tibiae with about 35–70 external dorsal spines.

Fore wings transparent and shiny, their venation as in Text-fig. 69; R with 2–4 posterior branches, occasionally rather irregular in their arrangement. Hind wings extending beyond fore wings by between half and third length of latter.

Tenth abdominal tergite somewhat enlarged. Supra-anal plate more or less triangular. Cerci as in Text-fig. 48. Subgenital plate as in Text-fig. 21.

General coloration green. Fastigium of vertex (and sometimes other parts of head) marked with red-brown or brown. Antennae mostly red-brown, brown, or dark brown (basal two segments largely green). Dorsal part of posterior margin of pronotum dark brown or black. Femoral spinules black. Tibial spines brown or black. Stridulatory organ brownish. Wings sometimes suffused with brown, and knees of all three pairs of legs sometimes brown. Cerci with dark tip.

♀ unknown.

MEASUREMENTS

Males

Total length (11): 32·5–38·3, mean 34·86.
Median length of pronotum (12): 2·8–4·2, mean 3·47.
Length of hind femur (13): 18·0–25·4, mean 21·35.
Length of fore wing (12): 20·7–24·3, mean 22·18.

VARIATION. The femoral spinules vary in number and there is great variation in the number of tibial spines. The coloration varies somewhat, especially in the extent of the brown component. The specimen from Lugh Ferrandi was the only one in which the wings and knees were suffused with brown.

DISCUSSION. The high degree of transparency shown by the fore wings of this species is found elsewhere in the genus only in *D. parva* sp. n., which is very much smaller. The shape of the male subgenital plate is also characteristic.

MATERIAL EXAMINED

♂ holotype; 10 ♂ paratypes, same data as holotype.

ETHIOPIA: Gherlogubi, 1.xi.1953 (*Bellehu*) (1 ♂); SOMALIA: Lugh Ferrandi, 11.xi.1953 (*Popov*) (1 ♂).

All in the British Museum (Natural History).

DISTRIBUTION. *D. vitriala* sp. n. probably occurs over a large part of the semi-desert area of eastern Africa.

20. ***Ducetia parva*** sp. n.

Holotype ♂, BRITISH SOMALILAND: Haud, 8° 28′ N., 45° 38′ E., 2,500 ft., night, 23.v.1932 (*Taylor*). In the British Museum (Natural History).

DIAGNOSIS. ♂. Small, total length less than 25 mm. Fore wings transparent and shiny, their venation as in Text-fig. 70; R with 3–4 posterior branches. Subgenital plate as in Text-fig. 22. Cerci as in Text-fig. 49.

♀ unknown.

DESCRIPTION. ♂. Fastigium of vertex compressed, sulcate above, Pronotum without lateral carinae ; humeral sinus rather poorly developed. Fore coxae unarmed. Fore femora with about 1 or 2 external spinules. Mid femora with about 10 external spinules. Hind femora with several very small external spinules ; terminal dorsal spine absent. Hind tibiae with about 65 external dorsal spines. Fore wings transparent and shiny, their venation as in Text-fig. 70 ; R with 3–4 posterior branches. Hind wings extending beyond fore wings by about quarter length of latter.

Tenth abdominal tergite unmodified or perhaps very slightly enlarged. Supra-anal plate large, quadrate. Cerci as in Text-fig. 49. Subgenital plate as in Text-fig. 22.

General coloration green. Vertex with red-brown on fastigium and dark brown stripe behind each eye. Antennae red-brown except for basal two segments, which are largely green. Femoral spinules dark-tipped. Stridulatory organ brownish.

♀ unknown.

MEASUREMENTS

Male

Total length : 23·6.
Median length of pronotum : 2·6.
Length of hind femur : 15·0.
Length of fore wing : 16·7.

DISCUSSION. This is the smallest known fully-winged species of *Ducetia* Stål. It has the general appearance of a small version of *D. vitriala* sp. n., from which, however, it differs in the shape of the subgenital plate.

MATERIAL EXAMINED

The holotype is unique.

NOIA Walker, 1870

Noia Walker, 1780, Catalogue of Dermaptera Saltatoria, p. 476. Type species, by monotypy, *Noia testacea* Walker, 1870.

Isotima Brunner, 1878, Monographie der Phaneropteriden, p. 112. Type species, by subsequent designation (Kirby, 1906, p. 399), *Isotima rufomarginata* Brunner, 1878. ***Syn. n.***

Isotimula Uvarov, 1940, *Ann. Mag. nat. Hist.* (11) **5** : 175. Nom. n. for *Isotima* Brunner, 1878 (nec Foerstder, 1868). ***Syn. n.***

DIAGNOSIS. ♂♀. Hind wings rudimentary. Media of male fore wing dividing very near wing-base, as in Text-fig. 71. Pronotum without lateral carinae ; lateral lobes with distinct angle in antero-ventral region of margin. Fastigium of vertex compressed, sulcate above. Fore tibiae with oval tympanic opening on both sides. Fore coxal spine absent.

DISCUSSION. The only character mentioned in the diagnosis above that enables *Noia* Walker to be separated from *Ducetia* Stål is the very proximal bifurcation of the media in the male fore wing. This feature is not shown by the female and is certainly not a good basis for a generic separation. As discussed on p. 172, *Noia* Walker is given separate status in this revision mainly for reasons of convenience.

The synonymy of *Isotima rufomarginata* Brunner with *Noia testacea* Walker, which results in the synonymy of *Isotima* Brunner and *Isotimula* Uvarov with *Noia* Walker, is mentioned below.

DISTRIBUTION. Known only from India.

Noia testacea Walker, 1870

Noia testacea Walker, 1870, Catalogue of Dermaptera Saltatoria, p. 476. Holotype ♀, N. INDIA ("Hindostan"). In the British Museum (Natural History).

Isotima rufomarginata Brunner, 1878, Mohographie der Phaneropteriden, p. 113. Holotype ♂, INDIA: Himalaya (*Hügel*). In the Naturhistorisches Museum, Vienna. ***Syn. n.***

DIAGNOSIS. ♂. Venation of fore wings as in Text-fig. 71. Cerci as in Text-fig. 50. Subgenital plate as in Text-fig. 23.

♀. Venation of fore wings as in Text-fig. 90. Ovipositor as in Text-fig. 76.

MEASUREMENTS

Male

Total length: 26·9.
Median length of pronotum: 4·6.
Length of hind femur: 21·5.
Length of fore wing: 22·1.

Female

Total length (to tip of fore wings): 32·7.
Median length of pronotum: 6·1.
Length of hind femur: unmeasurable.
Length of fore wing: 25·9.
Length of ovipositor: 11·4.

DISCUSSION. The affinities of this species are rather obscure. Although regarded as representing a distinct genus by both Walker and Brunner, there are no taxonomic characters which enable this species to be separated from *Ducetia* Stål. Brunner regarded the form and venation of the fore wings as being of generic value, but there are two other brachypterous species of *Ducetia* Stål (*D. javanica* (Brunner) and *D. punctata* (Schulthess)), and the radius may have lost its pectinate branches as a result of the brachypterism. The shape of the pronotum and fore tibiae, and the male genitalia, are all typical of *Ducetia* Stål.

It is impossible to be quite certain that the male holotype of *Isotima rufomarginata* Brunner is conspecific with the female holotype of the present species, but the resemblance is so close that I have no hesitation in regarding it as such.

MATERIAL EXAMINED

♀ holotype. ♂ holotype of *Isotima rufomarginata* Brunner.

DISTRIBUTION. Known only from India. The type locality of *Isotima rufomarginata* Brunner suggests the possibility that the species is an alpine one.

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NEW PSEUDOCOCCIDAE (HOMOPTERA : COCCOIDEA) FROM AFRICA

By G. DE LOTTO

THIS paper contains the descriptions of a first batch of thirty new species of Pseudococcidae from Africa south of the Sahara, found during the study of a large amount of material accumulated in the collection of the Scott Agricultural Laboratories, Nairobi. Many more new species are at hand which together with sundry notes on species already known from the area under review will be dealt with in a further paper to be published at a later date.

Many of the species described in the following pages cannot properly be placed in any known genus and their inclusion in the genera *Pseudococcus*, *Trionymus*, etc., has therefore to be understood as an entirely provisional measure pending a revision of the family.

The nomenclature used in the descriptions is that adopted by the late Prof. G. F. Ferris in his magnificent work on the scale insects of North America.

Allococcus aberiae sp. n.

(Plate 20)

External appearance of living adults not recorded. Mounted specimens elongate to rather broadly elliptical in outline; length up to 2·9 mm. Anal lobe cerarii each with two conical spines surrounded by a fairly close group of 30–40 trilocular pores and six to nine auxiliary setae; area besetting the cerarian spines not chitinized. The spines of the remaining cerarii become more slender and longer anteriorly, where they attain the same size and shape of some of the dorsal body setae and often tend to be set widely apart from each other. Each cerarius has two spines except the preocular cerarii (xvii) each of which at times carries one spine only. Two to eight trilocular pores are associated with each cerarius; auxiliary setae absent. Ventral side of each anal lobe with an irregularly shaped, poorly defined, elongate chitinized bar, at times much reduced in size due to the absence of the tract between the apical and subapical setae; occasionally the chitinized bar is missing altogether. Apical seta 220–235 μ long; subapical 60–75 μ.[1] Multilocular disc pores set in five groups on the ventral side of the last

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[1] All measurements in microns refer to the length of the structure for which they are given.

abdominal segments as follows: (ix + x) 25–35; (viii) 31–46; (vii) 21–35; (vi) 18–36; (v) 25–36. On the segments anterior to the genital opening they are arranged in linear transverse rows along the distal margin, except on the segment (viii) and—occasionally—on segment (vii) where a few occur near the basal margin. One or two multilocular pores at times occur near the attachment of the front or hind legs. The dorsal tubular ducts with oral rim are few and are arranged in a fairly regular pattern. The marginal series is present singly near each abdominal cerarius anterior to the anal lobes and near each frontal cerarius. Occasionally two ducts occur near each of the penultimate cerarii (ii). Median series extending from the second to the fifth—occasionally seventh—abdominal segments. Ducts of the submedian and submarginal series very irregular in number and arrangement, at times entirely absent. A few ducts are scattered on the dorsal side of the prosoma and along the ventral marginal area of the thorax. Ventral tubular ducts with oral collar crowded on the marginal area of all abdominal segments and, occasionally, on the metathorax; a small group occurs near each of the thirteenth pair of cerarii; a few more are associated with the transverse rows of multilocular disc pores and are scattered on the prosoma. Trilocular pores not numerous and evenly distributed on both surfaces of the body. Circular disc pores on dorsum smaller than the trilocular pores; those on venter about the same size as the latter. Anterior and posterior dorsal ostioles somewhat inconspicuous. Circulus absent Dorsal setae few and short; ventral ones much longer and more numerous. Legs all well developed but slender; hind tibia with some small translucent pores; dimensions of legs (iii): trochanter plus femur 285–330 μ; tibia plus tarsus 320–365 μ. Anal ring setae 125–155 μ. Beak 130–155 μ. Antennae with eight joints with a pseudoarticulation on the apical one; total length 420–490 μ.

KENYA. Nairobi: 12.iii.1941, eight mounted adult females collected on *Aberia caffra* Hook f. & Harv. (R. H. Le Pelley)—Coll. No. 1493; Nairobi; 24.ii.1954, eleven mounted adult females from *Aberia caffra* Hook f. & Harv. (G. De Lotto)—Coll. No. 1541.

Other records of the same species on material not included in the type series, are:

KENYA. Nairobi: 5.ix.1954 on *Olea europea* L. (G. De Lotto); Limuru: 10.iii.1937 on *Coffea arabica* L. (A. R. Melville); Molo: 7.ix.1953 on *Pyrus malus* L. (T. H. Jackson); Nairobi: 29.x.1953 on *Acokanthera schimperi* (D. C.) Benth. (G. De Lotto).

TANGANYIKA. Arusha: 19.x.1937 on *Psidium guajava* L. (A. R. Melville).

This species closely resembles *A. quaesitus* (Brain) but differs from it in the number and arrangement of the dorsal tubular ducts with oral rim. In *aberiae* these ducts are few and are set in a median and marginal series; in *quaesitus* they are much more numerous and tend to be arranged in transverse segmental rows.

Allococcus meridionalis sp. n.

(Plate 21)

Living adults not seen. Mounted specimens rather elongate elliptical, up to 2·9 mm. long. Anal lobe cerarii each with two conical spines surrounded by a loose group of 30–40 trilocular pores and four or five auxiliary setae; area about the cerarian spines not chitinized. Spines of the remaining cerarii attaining the same size but tending to be more slender towards the anterior end. Each preanal cerarius carries two spines, except the preocular (xvii) and occasionally the ocular (xvi) cerarius each of which has three spines. Each cerarius is beset by 4–8 trilocular pores but is devoid of auxiliary setae. Ventral side of each anal lobe with a very small chitinized bar arising from the subapical seta; apical seta 175–180 μ long; subapical one 45–50 μ. Multilocular disc pores arranged in seven groups on the ventral side of the last abdominal segments as follows: (ix + x) 39–44; (viii) 85–100; (vii) 81–109; (vi) 92–99; (v) 94–118; (iv) 9–10; (iii) 6–7. On the segments (viii) to (v) the multilocular pores are mostly arranged in transverse rows along the distal margin and a few are scattered near the basal margin; on segments (iv) and (iii) they are instead crowded in irregular groups near the margin on either side of the body. A few pores occur on the median and submedian ventral areas of the thorax. Dorsal tubular ducts with oral rim few. Marginal series occurring singly near each abdominal cerarius anterior to the anal lobe and between the preocular (xvii) and frontal (xviii) cerarii; ducts of the submarginal, submedian and median series arranged very irregularly. A few ducts are scattered on the thorax, head and along the ventral marginal area of the thorax. Ventral tubular ducts with oral collar crowded on the marginal area of all abdominal segments; a few are grouped near each of the (xiii) pair of cerarii and with the multilocular disc pores. Trilocular pores not numerous and uniformly distributed over the body. Circular disc pores smaller than the trilocular ones, few and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles inconspicuous. Circulus absent. Dorsal setae few, slender and very short; ventral ones much longer. Legs all well developed; hind tibia with a few very small translucent pores; dimensions of legs (iii): trochanter plus femur 285–300 μ; tibia plus tarsus 305–330 μ. Anal ring setae 120–130 μ. Beak 115 μ. Antennae with eight joints with a pseudoarticulation on the apical one; total length 440–450 μ.

South Africa. Belville: March 1931, three mounted adult females collected on *Geranium* sp. (C. J. Joubert)—Coll. No. 2462.

Very closely allied to *aberiae* De Lotto but differing from it in the number and arrangement of the multilocular disc pores, which in *meridionalis* are numerous and extend laterally to the edges of the abdominal segments. In *aberiae* they are few and restricted to the midregion of the abdomen.

Cataenococcus hypogeus sp. n.

(Plate 22)

Habit of the living adults not recorded. Mounted specimens broadly elliptical to nearly circular in outline; length up to 2·5 mm. Anal lobe cerarii each provided with eight to fifteen conical spines among which are intermingled some trilocular pores. Remaining cerarii of the abdomen and thorax structurally identical to those of the anal lobes; on the head the spines tend to be set in a continuous irregular series. Ventral side of each anal lobe without chitinized bar; apical seta 185–235 μ. Multilocular disc pores arranged in groups on the last three abdominal segments as follows: (ix + x) 15–38; (viii) 35–59; (vii) 23–47. No multilocular pores occur on the ventral prosoma or on the dorsum. Tubular ducts of oral collar type of two sizes. The larger ones are not numerous and are arranged in small groups on the ventral marginal area of the last three or four abdominal segments anterior to the anal lobes. The smaller ones tend to be crowded all along the ventral marginal area, close to the cerarian spines; a few are scattered on both surfaces of the body. Trilocular pores numerous and evenly distributed. Circular disc pores absent. Anterior and posterior dorsal ostioles inconspicuous, with membranous lips. Circulus transversely elongate. Dorsal setae of the anal segment fairly long, of normal shape; remaining dorsal setae variable in size, all knobbed on one side near the apex, as shown in the accompanying figure. The ventral setae present no distinctive feature; all are slender. Legs well developed, stout, with some minute translucent pores on the hind coxa; claw without denticle; dimensions of legs (iii): trochanter plus femur 255–290 μ; tibia plus tarsus 200–220 μ. Anal ring entire with six setae measuring 65–80 μ in length. Beak 220–240 μ. Antennae 7- or 8-jointed; in specimens in which the antennae are reduced to seven joints, one joint may be marked by a pseudoarticulation; total length 300–350 μ.

KENYA. Nairobi: 29.x.1953, eleven mounted adult females collected on roots of *Gelonium procerum* Prain (G. De Lotto)—Coll. No. 1513.

The shape of the dorsal setae clearly differentiates this species from all congeneric ones so far known from Africa south of the Sahara.

Cataenococcus jasmini sp. n.

(Plate 23)

Living adults not seen. Mounted specimens broadly elliptical in outline, up to 3·5 mm. long. Anal lobe cerarii each with a group of six to twelve robust conical spines surrounded by many trilocular pores; area about the cerarian spines not chitinized; auxiliary setae missing. All along the margin of the body the cerarian spines are arranged in a continuous, fairly regular series, without interruption. Ventral side of each anal lobe with a prominent, irregularly shaped, elongate chitinized bar enclosing a robust apical seta 140–160 μ, supplemented by some shorter ones. Multilocular disc pores present in small groups on the midregion of the last three abdominal segments as follows: (ix + x) 10–19; (viii) 16–25; (vii) 6–10. No multilocular disc pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts absent. Ventral tubular ducts of oral collar type of two sizes. The large ones are arranged in small groups on the marginal area of the abdomen and thorax and between the antennae; a few are present on the median area of the last three or four abdominal segments anterior to the genital opening. The small ducts are few and scattered without any particular pattern on the median and submedian areas of the abdomen. Trilocular pores numerous. Circular disc pores noticeably smaller than the trilocular pores, not numerous and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles well developed; in young specimens the lips are slightly chitinized. Circulus large, transversely elongate. Dorsal and ventral setae numerous, rather long. Legs all well developed, stout; hind coxa with some minute translucent pores; dimensions of legs (iii): trochanter plus femur 410–460 μ; tibia plus tarsus 340–380 μ. Anal ring entire, with six setae 125–145 μ long. Beak 275–315 μ. Antennae with eight joints measuring altogether 505–535 μ.

KENYA. Nairobi: 10.xi.1942, ten mounted adult females collected on *Jasminum* sp. (R. H. Le Pelley)—Coll. No. 236.

This species closely resembles *C. hypogeus* but differs in having a large chitinized bar on the ventral side of the anal lobes; furthermore in *hypogeus* the dorsal setae are knobbed at the apex, while in *jasmini* they are finely pointed, as is usually the case.

Dysmicoccus mollis sp. n.

(Plate 24)

Living adults not seen. Mounted specimens broadly elliptical, nearly circular in outline; length up to 2·9 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each enclosed within a rounded chitinized area and carries two robust conical spines beset by a group of about 50–60 trilocular pores and four to six auxiliary setae. Spines of the remaining cerarii smaller. Normally the spines occur in pairs, except on the metathorax where each of the (xii) cerarii have three spines. The most anterior pairs—(xv) to (xvii)—have three or four, occasionally five, spines. Each cerarius is associated with a small cluster of trilocular pores and two to five slender auxiliary setae. The area about the spines is not chitinized. Ventral side of each anal lobe with an elongate irregularly shaped chitinized bar; apical seta 125–140 μ long; subapical one 40–60 μ. Multilocular disc pores distributed ventrally on the seven ultimate abdominal segments as follows: (ix + x) 32–40; (viii) 54–68; (vii) 68–82; (vi) 61–66; (v) 46–59; (iv) 32–36; (iii) 17–22. On the segments anterior to the genital opening the pores are set in transverse rows along the distal margin and on segments (viii) to (vi) a few occur near the basal margin. No multilocular pores occur on the ventral side of the prosoma or on the dorsum. Dorsal tubular ducts of oral collar type few and sparsely scattered. Ventral tubular ducts also of oral collar type; they are crowded on the marginal area of all abdominal segments and intermingled with the multilocular disc pores; others are scattered on the thorax and head, mostly along the marginal and submarginal areas. Trilocular pores fairly numerous and evenly distributed. Circular disc pores noticeably smaller than the trilocular pores, few and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles well developed with membranous lips. Circulus large. Dorsal setae few, rather short and slender; ventral ones more numerous and somewhat longer. Legs all well developed, fairly stout; hind tibia with a few minute translucent pores; dimensions of legs (iii): trochanter plus femur 275–315 μ; tibia plus tarsus 285–320 μ. Anal ring setae

145–170 μ. Beak 140–155 μ. Antennae with eight joints, measuring together 385–425 μ.

UGANDA. Serere : 12.viii.1954, ten mounted adult females collected on roots of *Arachis hypogea* L. (W. R. Ingram)—Coll. No. 1679.

Closely allied to *D. senegalensis* Balachowsky, from which it departs in having eight segments to the antennae and more numerous multilocular disc pores.

Eurycoccus glomerulus sp. n.

(Plate 25)

Habit of living adults not recorded. Mounted specimens broadly elliptical in outline ; length up to 3 mm. Anal lobe cerarii each with two long slender spines set apart from each other, without any grouping of trilocular pores. Area about the cerarian spines not chitinized. Ventral side of each anal lobe without a chitinized bar ; apical seta 140–155 μ ; subapical one 80–95 μ. Multilocular disc pores arranged in transverse rows on the ventral side of the last five or six abdominal segments as follows : (ix + x) 39–54 ; (viii) 53–83 ; (vii) 45–86 ; (vi) 41–68 ; (v) 14–28 ; (iv) 0–5. No pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts entirely absent. Ventral tubular ducts of oral collar type of two sizes. The larger ducts are set in small groups on the marginal area of the last four or five abdominal segments. The smaller ducts are scattered on the ventral side of all abdominal segments. Trilocular pores not numerous and evenly distributed. Circular disc pores smaller than the trilocular pores and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles inconspicuous with membranous lips. Circulus very small, rounded. Ventral and dorsal body setae few and slender. Legs well developed ; hind coxa with some minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 195–235 μ ; tarsus plus tibia 220–240 μ. Anal ring setae 70–80 μ. Beak 100–115 μ. Antennae with six or seven joints measuring altogether 270–290 μ.

KENYA. Machakos : 4.ii.1956, nine mounted adult females collected on roots of *Setaria sphacelata* Stapf & Hubbard (G. De Lotto)—Coll. No. 1951.

This species comes close to *E. coccineus* (Newstead) from which it differs in having many more multilocular disc pores and by the absence of the chitinized bar on the ventral side of each anal lobe.

Natalensia nana sp. n.

(Plate 26)

Habit of living adults not recorded. Mounted specimens elongate to broadly elliptical in outline ; length up to 1·2 mm. Anal lobe cerarii each with three robust setae about 100 μ long, surrounded by a few trilocular pores ; area about the cerarian setae not chitinized. Ventral side of each anal lobe provided with a stout apical seta 140–160 μ long ; chitinized bar absent. Multilocular disc pores entirely absent ; except in one specimen in which one pore occurs just in front of the genital opening. Dorsal tubular ducts absent. Ventral tubular ducts of oral collar type set along the distal margin of all abdominal segments anterior to the genital opening; a few occur on the last abdominal segment and near the attachment of the hind legs. Trilocular pores few and uniformly distributed. Circular disc pores smaller than the trilocular ones, scattered on either surface of the body. Anterior and posterior dorsal ostioles inconspicuous, with membranous lips. Circulus absent. Dorsal and ventral body setae short and slightly knobbed at the apex; very few in number. Legs well developed but slender; translucent pores entirely missing; claw without denticle; dimensions of legs (iii): trochanter plus femur 140–150 μ; tibia plus tarsus 150–160 μ. Anal ring entire with a few small cells and with six setae attaining 65–80 μ in length. Beak 95–105 μ. Antennae with six joints, not geniculate; three falcate sensory setae are inserted on the apical joint and one on the preapical one; total length 180–190 μ.

KENYA. Nairobi: 16.xi.1955, three mounted adult females collected on roots of *Themeda triandra* Forsk. (G. De Lotto)—Coll. No. 1901.

Species close to *N. fulleri* Brain from which it differs in having three setae instead of two on the anal lobe cerarii and in having some tubular ducts on the ventral side of the abdomen, which in *fulleri* are entirely absent.

Phenacoccus alienus sp. n.

(Plate 27)

Living adults not seen. Mounted specimens elongate to rather broadly elliptical in outline; length up to 2·5 mm. Marginal cerarii recognizable only on the last three or four abdominal segments. Anal lobe cerarii each built up of two lanceolate spines surrounded by a loose group of trilocular pores and four or five minute auxiliary setae. The spines of the remaining cerarii tend to be progressively smaller and more widely separated from each other, without any grouping of trilocular pores. Auxiliary setae absent. Ventral side of each anal lobe without a chitinized bar; apical seta 145–155 μ; subapical one 20–30 μ. Multilocular disc pores arranged in transverse segmental rows on the ventral side of the last three or four abdominal segments as follows: (ix + x) 22–33; (viii) 20–59; (vii) 5–29; (vi) 0–13. No multilocular pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts absent. Ventral tubular ducts of the oral collar type few, mostly in association with the multilocular disc pores; a few are scattered all over the venter. Quinquelocular pores absent. Trilocular pores rather few and uniformly distributed. Circular disc pores smaller than the trilocular pores, not numerous and scattered on either surface of the body. Anterior and posterior dorsal ostioles inconspicuous with membranous lips. Circulus absent. Dorsal setae small and slender, ventral ones somewhat longer, in both cases very few. Legs short otherwise normal, with a small denticle on the claw; hind legs without translucent pores; dimensions of legs (iii): trochanter plus femur 175–210 μ; tibia plus tarsus 210–255 μ. Anal ring setae 75–95 μ. Beak 80–90 μ. Antennae with eight joints, with a well-marked pseudoarticulation on the apical joint; total length 250–270 μ.

SOUTH AFRICA. Middleburg: January 1954, seven mounted adult females collected on roots of grass (E. E. Anderssen)—Coll. No. 1658.

The reduction on the number of marginal cerarii easily distinguishes *P. alienus* from all species referable to the genus *Phenacoccus* so far known from Africa south of the Sahara.

Phenacoccus trionymoides sp. n.

(Plate 28)

Habit of living adults not recorded. Mounted specimens elongate elliptical in outline, up to 2 mm. long. Margin of the body with two pairs of cerarii. Anal lobe cerarii each with two conical spines surrounded by 20–30 trilocular pores and four to six auxiliary setae; area about the cerarian spines not chitinized. Spines of the preanal cerarii slightly smaller with a group of about 12 trilocular pores and two to three slender auxiliary setae. Ventral side of each anal lobe without chitinized bar; apical seta 100–130 μ long; subapical one 35–45 μ. Multilocular disc pores arranged in five groups on the ventral side of the last abdominal segments as follows: (ix + x) 28–39; (viii) 33–57; (vii) 27–49; (vi) 12–28; (v) 4–12. On all segments anterior to the genital opening the pores are set along the distal margin, except on the (viii) segment on which a few are set near the basal margin. One or two pores occasionally occur near the attachment of the middle and hind legs; a few more pores are present on the dorsal midregion of the last abdominal segments. The dorsal tubular ducts of oral rim type have very indistinct rims. These ducts are set in a fairly regular median and marginal series extending respectively from the penultimate and antepenultimate abdominal segments as far as the head. A few ducts are interpolated between these two series. A few more ducts occur on the ventral marginal and submarginal areas of the abdomen and thorax. Tubular ducts of oral collar type of two sizes. The larger ones are very numerous. On either surface of the abdomen and on the dorsal surface of the thorax they are arranged in transverse segmental rows; on both surfaces of the head and on the ventral surface of the thorax they tend to be crowded into small irregular groups. Tubular ducts of smaller size, few in number and distributed on either surface of the body in association with those of the larger size. Quinquelocular pores absent. Trilocular pores few. Circular disc pores much smaller than the trilocular pores, few and scattered over both surfaces of the body. Anterior and posterior dorsal ostioles inconspicuous with membranous lips. Circulus absent. Dorsal setae few and very small; ventral ones also sparse but longer. Legs all well developed; claws with a small denticle; hind tibia with a few translucent pores; dimensions of legs (iii): trochanter plus femur 235–265 μ; tibia plus tarsus 265–285 μ. Anal ring setae 95–110 μ. Beak 100–110 μ. Antennae 8-jointed with a pseudoarticulation on the apical joint; total length 350–410 μ.

KENYA. Nairobi: 9.xi.1956, thirteen mounted adult females collected on *Caralluma dummeri* (NE. Br.) S. A. Bruce (P. T. O. Bally)—Coll. No. 2099.

This species is assigned to the genus *Phenacoccus* inasmuch as the claws are provided with a tooth. Structurally it appears more closely related to *Trionymus sanguineus* James than to any African species of the " *Phenacoccus* group ", although in *sanguineus* the ungual denticles are entirely absent.

Planococcus crassus sp. n.

(Plate 29)

Living adult females at full maturity highly convex, nearly hemispherical, covered by granulate white wax; lateral and caudal filaments short. Mounted specimens broadly elliptical to nearly circular in outline; length up to 2·9 mm. Anal lobe cerarii each with two conical spines beset by five to seven auxiliary setae and a group of about 40 trilocular pores; area about cerarian spines not chitinized. Remaining cerarii each carrying two spines, except for the last five or six pairs anterior to the anal lobes, each of which have three or four spines, often of different size, at times supplemented by one or two small auxiliary setae. Occasionally three spines occur on each of the most anterior cerarii, namely the (xvi), (xvii) and (xviii). Ventral side of each anal lobe with an elongate chitinized bar; apical seta 260–300 μ; subapical one 80–110 μ. Multilocular disc pores set in five groups on the ventral side of the last abdominal segments as follows: (ix + x) 18–34; (viii) 25–38; (vii) 27–39; (vi) 16–25; (v) 3–8. On all segments anterior to the genital opening the pores are arranged in transverse rows along the distal margin only. No multilocular pores occur on the ventral side of the prosoma or on the dorsum. Dorsal tubular ducts entirely absent. There are a few ventral tubular ducts with an oral collar, arranged in very small groups on the marginal area of the last three or four abdominal segments anterior to the anal lobes. Three to five of these ducts occur on either side of the (x) abdominal segment; a few more of them are intermingled with the multilocular disc pores. Trilocular pores numerous on either surface of the body. The circular disc pores are of roughly the same size as the trilocular pores, and are arranged in small groups along the dorsal median line of the abdomen anterior to the anal lobe segment; a few are scattered over the dorsum and the venter but in no particular pattern. Dorsal setae fairly long, not numerous; ventral ones longer and more slender. Anterior and posterior dorsal ostioles prominent. Circulus large, transversely elongate. Legs all well developed; hind tibia at times with a few translucent pores; dimensions of legs (iii): trochanter plus femur 280–310 μ; tibia plus tarsus 270–285 μ. Beak 175–225 μ. Anal ring setae 100–140 μ. Antennae with eight joints, together measuring 415–450 μ in length.

KENYA. Nairobi: 12.xii.1955, ten mounted females collected on *Ficus* sp. (G. De Lotto)—Coll. No. 1944.

This species is very close to *latipes* De Lotto which originally was assigned to the genus *Pseudococcus*. It differs from *latipes* in the absence of multilocular disc pores on the dorsum and on the ventral side of the prosoma and in the absence of a chitinized area on the anal lobe cerarii.

Planococcus flagellatus sp. n.

(Plate 30)

Living adults not seen. Mounted specimens fairly broadly elliptical in outline, up to 2·5 mm. long. Anal lobe cerarii each with two conical spines beset by a loose group of 20–30 trilocular pores and two or three auxiliary setae; area about the cerarian spines not chitinized. All remaining cerarii have two spines noticeably longer and more slender than those of the anal lobe cerarii, strongly flagellate and best by 8–12 trilocular pores; auxiliary setae absent. At times one of the abdominal cerarii—usually the (vii)—carries one spine only and in one specimen it was absent altogether on one side of the body. Ventral side of each anal lobe with an elongate chitinized bar; apical seta 230–250 μ long; subapical one 45–75 μ. Multilocular disc pores arranged in seven groups on the ventral side of the abdominal segments as follows: (ix + x) 20–37; (viii) 52–67; (vii) 70–107; (vi) 87–134; (v) 52–95; (iv) 31–50; (iii) 11–20. On all segments anterior to the genital opening these pores are mostly set in transverse rows along the distal margin and some are scattered over the same segments. Six to fourteen pores occur near the attachment of the fore legs; four to twelve pores on the head anterior to the mouth parts. A few more are scattered on the ventral prosoma. No multilocular pores occur on the dorsum. Dorsal tubular ducts normally absent, except in two specimens in which one duct of the oral collar type occurs on the marginal area of one of the preanal segments. Ventral tubular ducts with oral collar all of the same size and set in groups on the marginal area of the last five to seven abdominal segments; others are associated with the transverse rows of multilocular disc pores or are scattered over the prosoma. Trilocular pores not numerous and uniformly distributed on either surfaces of the body. Circular disc pores slightly smaller than the trilocular ones, sparse, scattered on dorsum and venter, but in no particular pattern. Dorsal setae few, fairly robust; ventral ones equally sparse, but longer and more slender. Anterior and posterior dorsal ostioles well developed, with membranous lips. Circulus very small, rounded, set near the distal margin of the (iv) abdominal segment. Legs all well developed; hind coxa and tibia with a few translucent pores; dimensions of legs (iii): trochanter plus femur 260–290 μ; tibia plus tarsus 275–305 μ. Anal ring setae 115–130 μ. Beak 130–160 μ. Antennae with eight joints, measuring altogether 365–405 μ in length. In one specimen one of the antennae was ill-formed and had seven joints only.

UGANDA. Sebei: 18.ii.1957, seven mounted adult females collected on roots of *Vernonia auriculifera* Hiern. (D. J. McNutt)—Coll. No. 2144.

This species comes close to *P. kraunhiae* (Kuwana) but in *flagellatus* the dorsal tubular ducts are normally absent. The circulus is much smaller and set close to the distal margin of the (iv) abdominal segment, whilst in *kraunhiae* it extends across the intersegmental furrow between the (iv) and (v) segments.

Planococcus formosus sp. n.

(Plate 31)

Habit of living adults not seen. The mounted holotype specimen is a rather old adult female, very broadly, elliptical nearly circular in outline, 1·5 mm. long. Anal lobe cerarii each with two stout conical spines enclosed within a large chitinized area and beset by 11–14 trilocular pores and four or five slender auxiliary setae. Spines of all remaining cerarii slightly smaller, often of different size. Most of the preanal lobe cerarii have two spines, but those on the last three to five abdominal segments and the ocular cerarii (xvi) usually have three or four spines. The number of spines on each cerarius of the holotype specimen is as follows : (i) 2–2 ; (ii) 3–4 ; (iii) 3–3 ; (iv) 2–3 ; (v) 2–2 ; (vi) 2–3 ; (vii) 2–2 ; (ix) to (xv) 2–2 ; (xvi) 3–3 ; (xvii) 2–2 ; (xviii) 1–2. Each cerarius is surrounded by 2–12 trilocular pores ; area about the cerarian spines not chitinized ; auxiliary setae absent. Ventral side of each anal lobe with an elongate chitinized bar ; apical seta 280 μ ; subapical one 60 μ. Multilocular disc pores very few, set in three groups on the ventral side of the last abdominal segments as follows : (ix + x) 5 ; (viii) 7 ; (vii) 4. Dorsal tubular ducts entirely absent. Ventral tubular ducts of oral collar type arranged in groups of one to four on the marginal and submarginal areas of the last four abdominal segments anterior to the anal lobes ; a few are scattered on the ventral prosoma. Trilocular pores very few and sparsely distributed on both surfaces of the body. Circular disc pores of two sizes. The larger ones attain the same size as the trilocular pores and are arranged in eight groups along the median line of the dorsum ; others are distributed along the dorsal marginal area and on the venter. Circular disc pores of smaller diameter are distributed on both surfaces of the body in no particular pattern. Dorsal and ventral body setae few, short and slender, except a few on the ventral side of the head and abdomen which are somewhat longer. Anterior and posterior dorsal ostioles prominent with moderately chitinized lips. Circulus large, transversely elongate. Legs all well developed, very stout ; hind coxa and tibia with a few translucent pores ; dimensions of legs (iii) : trochanter plus femur 250 μ ; tibia plus tarsus 250 μ. Anal ring setae 90 μ. Beak 90 μ. Antennae with eight joints measuring altogether 360 μ.

UGANDA. Kisinga : 22.vii.1955, one mounted adult female collected on *Coffea arabica* L. (T. J. Crowe)—Coll. No. 1884.

Species very close to *rotundatus* De Lotto from which it differs in having the anal lobe cerarii enclosed within a large chitinized area and some of the marginal cerarii anterior to those on the anal lobes provided with more than two spines.

Planococcus hospitus sp. n.

(Plate 32)

Living adult female not seen. Mounted specimen holotype broadly elliptical, 1·8 mm. long. Anal lobe cerarii each with two robust conical spines surrounded by about 20 trilocular pores and three or four auxiliary setae ; area about the cerarian spines not chitinized. All remaining cerarii with two spines, except the (xvi) pair which on one side is reduced to one spine only. Each cerarius is beset by 8–12 trilocular pores but is devoid of auxiliary setae. Ventral side of each anal lobe with an elongate chitinized bar ; apical seta 200 μ long ; subapical one 60 μ. Multilocular disc pores set in four groups on the ventral side of the last abdominal segments as follows : (ix + x) 16 ; (viii) 23 ; (vii) 29 ; (vi) 7. On all segments anterior to the genital opening the multilocular pores are arranged in transverse rows along the distal margin only. No pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts entirely absent. Ventral tubular ducts of oral collar type very few on the midregion of the last four abdominal segments anterior to the genital opening ; no tubular ducts occur along the margin of the body. The trilocular pores are not numerous and are evenly distributed. Circular disc pores very large, attaining the same size as the multilocular disc pores. Some of these disc pores are arranged in small irregular groups along the dorsal median line from the preanal segment up to the thorax ; many others are scattered on either surface of the body, but in no particular pattern. Anterior and posterior dorsal ostioles well developed, having slightly chitinized lips. Circulus rather small, rounded. Dorsal setae small ; ventral ones longer, in both cases few in number. Legs all well developed ; translucent pores on hind legs absent ; dimensions of legs (iii) : trochanter plus femur 220 μ ; tibia plus tarsus 200 μ. Anal ring setae 100 μ. Beak 145 μ. Antennae with eight joints measuring together 345 μ in length.

UGANDA. Kampala : 18.x.1956, one adult female holotype collected on tubers of *Eulophia* sp. (A. G. P. Michelmore)—Coll. No. 2421.

Very close to *rotundatus* De Lotto but differing from it in the absence of tubular ducts on the ventral marginal area of the abdomen and by the size of the circular disc pores which in *rotundatus* are much smaller in diameter. Furthermore in *hospitus* the multilocular disc pores are more numerous.

Planococcus nigritulus sp. n.

(Plate 33)

Living adults not seen. Mounted specimens broadly elliptical to nearly circular in outline, up to 2·5 mm. long. Anal lobe cerarii each with two robust conical spines surrounded by a loose group of 20–25 trilocular pores and one or two short auxiliary setae ; area about cerarian spines not chitinized. All remaining cerarii have two spines of the same size as those of the anal cerarii, beset by 6–12 trilocular pores, without auxiliary setae. One of the thoracic cerarii—usually the (xi)—carries only a single spine. Ventral side of each anal lobe with an elongate chitinized bar ; apical seta 220–290 μ ; subapical one 60–90 μ. Multilocular disc pores present ventrally on five or six ultimate abdominal segments as follows : (ix + x) 41–53 ; (viii) 44–71 ; (vii) 48–80 ; (vi) 45–73 ; (v) 29–41 ; (iv) 0–3. On all abdominal segments anterior to the genital opening most of the pores are arranged in transverse rows along the distal margin, but a few are scattered over the segment ; two to four pores occur on the head anterior to the mouth parts ; one to three more pores occur on the dorsal marginal area between the (xvi) and (xv) pairs of cerarii. No multilocular disc pores are associated with the stigmatic opening or near the attachment of the legs. Dorsal tubular ducts entirely absent. Ventral tubular ducts of oral collar type of two sizes. The larger ones are set in small groups on the ventral marginal area as far as the head. They are absent, however, on the last abdominal segment. The smaller ducts are very sparse and are associated with the transverse segmental rows of multilocular disc pores. Trilocular pores numerous and evenly distributed on both surfaces of the body. The circular disc pores are somewhat larger than the trilocular pores ; they are set in five to seven groups on the dorsal side of the thorax and on the first to third abdominal segments along the median line. Other circular pores are scattered on both surfaces of the body. Dorsal setae very small ; ventral ones longer and more slender ; in either case they are few. Anterior and posterior dorsal ostioles prominent with membranous lips. Circulus rather large, transversely elongate. Legs all well developed, fairly stout ; hind coxa and tibia with some translucent pores ; dimensions of legs (iii) : trochanter plus femur 260–305 μ ; tibia plus tarsus 250–285 μ. Anal ring setae 95–110 μ. Beak 155–175 μ. Antennae with eight joints, measuring together 350–380 μ.

BELGIAN CONGO. Katana : 15.x.1941, fifteen mounted adult females collected on *Pheonix canariensis* L. (F. L. Hendrick)—Coll. No. 1499.

This species is very close to *citri* (Risso) from which it differs in the total absence of tubular ducts on the ventral side of the last abdominal segment ; furthermore the body content of *nigritulus* is very dark brown, almost black, while in *citri* it is light pinkish.

Pseudococcus bruguierae sp. n.

(Plate 34)

Living adult not seen. Mounted female holotype elliptical in outline, 2·1 mm. long Margin of the body with a series of seventeen pairs of cerarii. Anal lobe cerarii each with two conical spines surrounded by a group of 30–40 trilocular pores and four or five auxiliary setae ; area about the cerarian spines not chitinized. Each of the remaining cerarii also with two spines, slightly smaller, except for the frontal cerarii (xvii) which both have three spines, and the ocular cerarii (xvi), one of which carries four spines, the other six. Each cerarius is beset by 10–15 trilocular pores and is devoid of auxiliary setae. Ventral side of each anal lobe with an ill-defined slightly chitinized elongate bar ; apical seta 225 μ ; subapical one 60 μ. Multilocular disc pores set in six groups on the ventral side of the last abdominal segments as follows : (ix + x) 29 ; (viii) 53 ; (vii) 39 ; (vi) 44 ; (v) 41 ; (iv) 14. On the segments anterior to the genital opening all pores are arranged in transverse rows along the distal margin, except on the (viii), (vii) and (vi) segments on which a few pores are scattered along the basal margin. There are very few dorsal ducts of the oral collar type. On one side of the body one duct occurs near the (iv) cerarius and two near the (ix) ; on the opposite side two ducts are associated with the (ii) and (iii) cerarii. Ventral tubular ducts very numerous and crowded on the marginal area, forming a nearly continuous band from the last abdominal segment as far as the head. A few ducts, slightly smaller in size, are associated with the multilocular disc pores. Trilocular pores few and uniformly distributed. Circular disc pores noticeably smaller than the trilocular pores, very few. Anterior and posterior dorsal ostioles rather inconspicuous, with membranous lips. Circulus fairly large. Dorsal setae small, few ; ventral ones longer and more numerous. Legs all well developed ; translucent pores apparently absent ; dimensions of legs (iii) : trochanter plus femur 285 μ; tibia plus tarsus 260 μ. Beak 95 μ. Anal ring setae 145 μ. Antennae with eight joints, measuring together 410 μ in length.

KENYA. Mombasa : 30.ix.1957, one mounted adult female holotype collected on *Bruguiera gymnorhiza* (L.) Lam. (R. H. Le Pelley)—Coll. No. 2234.

This species bears a very close resemblance to *burnerae* Brain, but departs from it in having much more numerous ventral tubular ducts along the marginal area of the body ; the multilocular disc pores are also more numerous and are set in six groups instead of five as is the case in *burnerae* ; furthermore in the latter the dorsal tubular ducts are much less numerous.

Pseudococcus cryophilus sp. n.

(Plate 35)

Living adults not seen. Mounted specimens elongate elliptical in outline ; length up to 3·5 mm. Margin of the body with two pairs of cerarii only. Anal lobe cerarii each with four to eight robust conical spines of different size, among which are intermingled a few trilocular pores and one to three robust auxiliary setae ; the spines are surrounded by an ill-defined chitinized area. Preanal cerarii similar to those of the anal lobes but the area about the cerarian spines is not chitinized and the number of spines is reduced to one to four. Ventral side of each anal lobe without a chitinized bar ; apical seta 130–190 μ long. Multilocular disc pores scattered on both surfaces of the body. Tubular ducts with oral collar or oral rim entirely absent. They are replaced by small ducts as shown in the accompanying figure. These ducts are very numerous on both surfaces of the body. Trilocular pores very sparse and irregularly scattered on the dorsum and venter. Circular disc pores smaller than the trilocular pores, fairly numerous all over the body. Anterior and posterior dorsal ostioles inconspicuous with membranous lips. Circulus absent. Dorsal and ventral body setae not numerous, rather short and slender. Legs well developed ; claws without denticle ; hind femur and tibia with some minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 225–260 μ ; tibia plus tarsus 235–280 μ. Anal ring entire with six setae attaining 150–180 μ in length. Beak 100–125 μ. Antennae with seven joints, except in two specimens in which one of the antennae was reduced to six joints ; total length of the 7-jointed antennae 260–315 μ.

KENYA. Mt. Kenya : 15.i.1951, twenty mounted adult females collected at about 16,000 ft. altitude on *Festuca pilgeri* St. Ives (R. H. Le Pelley)—Coll. No. 1083.

Pseudococcus occiduus sp. n.

(Plate 36)

Habit of living adults not recorded. Mounted specimens rather elongate elliptical, up to 3·2 mm. long. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two robust conical spines surrounded by numerous trilocular pores and four or five auxiliary setae; chitinized area large, elongate. Each of the remaining cerarii normally carries two spines, except the (xii), (xv) and (xvii) pairs each of which has three; four or five spines occur on the ocular cerarii (xvi). The spines tend to become progressively smaller anteriorly. Each cerarius is associated with a cluster of trilocular pores, three to five slender auxiliary setae, and is enclosed within a rounded chitinized area. Ventral side of each anal lobe with an irregularly-shaped elongate chitinized bar; apical seta 160–190 μ long; subapical one 90–110 μ. Multilocular disc pores occurring in five groups on the ventral side of the last abdominal segments as follows: (ix + x) 23–59; (viii) 46–102; (vii) 41–97; (vi) 15–36; (v) 5–22. On the segments anterior to the genital opening the pores are arranged along the distal margin, except on the (viii) and—occasionally—on the (vii) segments on which a few are present near the basal margin; two or three pores at times occur on the dorsal side of the preanal abdominal segment. Dorsal tubular ducts of oral rim type small, rather numerous and crowded near each marginal cerarius, except on the anal lobes where they are absent. A few ducts are scattered over the dorsum and along the ventral marginal areas of the head, thorax and first two or three abdominal segments. Ventral tubular ducts with oral collar arranged in groups on the marginal area of all abdominal segments; a few are associated with the multilocular disc pores and are scattered over the prosoma. Trilocular pores not numerous and uniformly distributed. Circular disc pores much smaller than the trilocular pores, very few and scattered on both surfaces of the body. Anterior dorsal ostioles inconspicuous; posterior ones well developed; both having membranous lips. Circulus large, transversally elongate. Dorsal setae fairly long, not numerous; ventral ones much longer and more numerous. Legs all well developed, slender; hind tibia with a few translucent pores; dimensions of legs (iii): trochanter plus femur 460–540 μ; tarsus plus tibia 505–635 μ. Anal ring setae 170–220 μ. Beak 125–145 μ. Antennae with eight joints, measuring together 610–750 μ in length.

UGANDA. Entebbe: 2.vii.1954, eleven mounted adult females collected on *Coffea robusta* Lind. (W. R. Ingram)—Coll. No. 1677.

Other records of the same species on material not included in the type series, are:

BELGIAN CONGO. Elizabethville: January 1930 on *Coffea* sp. (C. J. Joubert.)

KENYA. Kiambu: 4.vi.1953 on *Coffea arabica* L. (D. J. McCrae); Kisii: 18.ii.1937 on *Coffea arabica* L. (A. R. Melville); Nairobi: 2.ix.1951 on *Acokanthera schimperi* (D. C.) Benth. (G. De Lotto); 19.vi.1937 on *Nerium oleander* L. (A. R. Melville); Ruiru: 31.x.1953 on *Sapium ellipticum* Pax. (G. De Lotto).

TANGANYIKA. Arusha: 29.x.1937 on *Coffea arabica* L. and *Psidium guajava* L. (A. R. Melville).

UGANDA. Toro: 14.iii.1951 on *Coffea arabica* L. (D. J. McCrae).

The large number of small dorsal tubular ducts with oral rim associated with the marginal cerarii clearly distinguishes this species from all others of the genus *Pseudococcus* as recently restricted by Ferris.

Pseudococcus percrassus sp. n.

(Plate 37)

Living adults not seen. Mounted specimens nearly circular in outline ; length up to 2·8 mm. Margin of the body with a series of eighteen pairs of cerarii. Anal lobe cerarii each with four or five conical spines surrounded by many stout auxiliary setae and several trilocular pores. All remaining cerarii are similar to those of the anal lobes, except on the thorax and head where the cerarian spines are reduced to two to four. Ventral side of each anal lobe with an irregularly-shaped chitinized bar ; apical seta 175–220 μ. Multilocular disc pores set in transverse rows on the ventral side of the last five abdominal segments. The number of pores in the holotype specimen is as follows : (ix + x) 69 ; (viii) 80 ; (vii) 134 ; (vi) 113 ; (v) 78.[1] On the three segments anterior to the vulvar opening some of the multilocular pores are arranged along the basal margin. No multilocular disc pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts absent. Ventral tubular ducts of oral collar type few ; they occur on the penultimate (viii) and antepenultimate (vii) abdominal segments in association with the multilocular disc pores. Trilocular pores very numerous on both surfaces of the body. Circular disc pores rather variable in size, mostly somewhat smaller than the trilocular pores, not numerous and scattered all over the body. Anterior and posterior dorsal ostioles very conspicuous with moderately chitinized lips. Circulus transversely elongate. Dorsal setae short, very numerous ; ventral ones slightly longer, slender, also numerous. Legs all well developed, stout ; hind coxa with some minute translucent pores ; dimensions of legs (iii) : trochanter plus femur 410–450 μ ; tibia plus tarsus 350–360 μ. Anal ring setae 115–130 μ. Beak 210–225 μ. Antennae with eight joints measuring together 550–620 μ.

UGANDA. Kampala : 8.xi.1956, two mounted adult females collected on *Cyperus papyrus* L. (F. M. Kasaija)—Coll. No. 2403.

Pseudococcus pulcherrimus sp. n.

(Plate 38)

Living adults not seen. Mounted specimens elongate elliptical in outline ; anal lobes prominent ; length up to 1·3 mm. Marginal cerarii reduced to six pairs, two of which occur on the last two abdominal segments and four pairs on the head and thorax. The anal lobe cerarii each carries a group of nine to twelve robust conical spines surrounded by a large chitinized area which in part extends to the ventral side of each lobe ; among the cerarian spines are intermingled some trilocular

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[1] In the paratype specimen the ventral abdominal area was distorted so that the number of multilocular disc pores on the various segments could not be satisfactorily counted.

pores ; auxiliary setae entirely absent. All remaining cerarii are structurally identical with those of the anal lobes except that the chitinized area is smaller. The ventral side of each anal lobe has a small apical seta 65–75 μ long and no chitinized bar. On the ventral side of the body the multilocular disc pores are arranged in transverse groups on all abdominal segments. In five specimens the number of pores occurring on each segment was found as follows : (ix + x) 76–114 ; (viii) 90–136 ; (vii) 111–134 ; (vi) 114–163 ; (v) 88–144 ; (iv) 86–121 ; (iii) 37–68. Other multilocular pores are scattered over the head and thorax, mostly along the marginal area of the body. Dorsal tubular ducts small, devoid of oral collar or oral rim. They occur in two compact groups near the margin of the body, one on the mesothorax, the other much larger and elongate in shape, extends from the metathorax to the first three or four abdominal segments. Each group of these ducts is bordered by numerous multilocular disc pores set close to one another in a continuous regular line. The ventral tubular ducts are also devoid of oral rim or oral collar, and partly project from the integument of the body. A single duct occurs on the submedian area of all abdominal segments anterior to the genital opening ; a few are scattered over the thorax. Circular disc pores absent. Trilocular pores very few. Dorsal ostioles and circulus absent. Dorsal setae conical or slightly lanceolate in shape. One fairly large lanceolate seta occurs on the submedian area of the three or four abdominal segments anterior to the anal lobes ; other setae, smaller in size, are set in pairs or in small groups as shown in the accompanying figure. Ventral setae normal, slender and very few. Legs unusually long and slender ; claw without a denticle ; translucent pores entirely absent ; dimensions of legs (iii) : trochanter plus femur 360–410 μ ; tibia plus tarsus 480–550 μ. Anal ring entire with six setae measuring 115–140 μ in length. Beak two-segmented, 80–90 μ long. Antennae of nine long slender joints, measuring together 670–735 μ.

KENYA. Mombasa : 7.xi.1956, eight mounted adult females collected on leaves of *Flacourtia indica* (Burm. f.) Merr. (R. H. Le Pelley)—Coll. No. 2089.

This peculiar mealybug appears to have no relationship to any other known to the writer. Its inclusion in the genus *Pseudococcus* is purely provisional.

Pseudococcus spinulosus sp. n.

(Plate 39)

Living adults not seen. Mounted specimens elliptical, up to 2·1 mm. long. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two conical spines surrounded by a group of about 40–50 trilocular pores and four to six auxiliary setae ; area about the spines not chitinized.[1] The remaining cerarii have each two spines, except the (x) and the (xv) which are usually reduced to one spine only ; the (xii) to (xiv), (xvi) and (xvii) cerarii normally have three spines. The spines are more slender than those of the anal lobes and often are of different size. Each cerarius is beset by a small group of trilocular pores, but without auxiliary setae. Ventral side of each anal lobe without chitinized bar ; apical seta

[1] In one specimen one of the anal lobe cararii was missing.

robust, 240–265 μ; subapical one 50–65 μ. Multilocular disc pores set in three or four groups on the ventral side of the last abdominal segments as follows: (ix + x) 14–20; (viii) 19–23; (vii) 2; (vi) 0–1. Dorsal tubular ducts with oral rim normally absent, except in one specimen in which on one side of the body one duct is associated with the (vi) cerarius and on the opposite side one duct occurs near the (vii) cerarius. Ventral tubular ducts with oral collar tend to be crowded along the marginal area of all abdominal segments, and are set in transverse rows along the distal margin of the (iv) to (vii) abdominal segments. Trilocular pores fairly numerous and uniformly distributed on either surface of the body. Circular disc pores somewhat smaller than the trilocular pores, numerous and scattered at random all over the body. Anterior and posterior dorsal ostioles well developed, with membranous lips. Circulus absent. Dorsal setae fairly numerous, very robust and long; ventral ones shorter and slender, except for one seta inserted on the marginal area of each abdominal segment anterior to the anal lobes which is as stout as those of the dorsum. Legs well developed; translucent pores absent; dimensions of legs (iii): trochanter plus femur 340–360 μ; tibia plus tarsus 370–380 μ. Anal ring setae 110–130 μ Beak 150–160 μ. Antennae with eight joints, measuring together 395–415 μ.

UGANDA. Kampala: 21.xii.1953, three mounted females collected of roots of *Saccharum officinarum* L. (A. G. P. Michelmore)—Coll. No. 1813.

This species comes close to *P. muraltiae* Brain, but differs from it in having the multilocular disc pores arranged in three groups instead of five, and in having very long robust dorsal setae; furthermore in *spinulosus* the dorsal tubular ducts with oral rim are normally absent.

Rhizoecus perprocerus sp. n.

(Plate 40)

Living adults not seen. Mounted specimens elongate elliptical, membranous at maturity; length up to 1·7 mm. Anal lobe cerarii each with three setae about 75 μ long, surrounded by a few trilocular pores; area about the cerarian setae not chitinized. Multilocular disc pores rather numerous on the dorsum and venter. Tubular ducts with oral collar small; they are few and scattered on both surfaces of the body. Trilocular pores rather numerous and evenly distributed. Circular disc pores absent. Tritubular ducts fairly large in size; on the dorsum they are arranged in a marginal and median series; on the venter they are set in a submarginal and submedian series on the abdomen only; one or two ducts occur near each stigmatic opening and one is inserted in front of the mouth parts. Anterior and posterior dorsal ostioles small with slightly chitinized lips. Circulus and ventral cephalic plate absent. Dorsal setae small; ventral ones longer and more numerous. Legs well developed, with ungual digitules finely pointed; hind legs without translucent pores; dimensions of legs (iii): trochanter plus femur 145–160 μ; tibia plus tarsus 155–175 μ. Anal ring set close to the abdominal extremity, entire, with six setae measuring about 60 μ in length. Beak 85–95 μ. Antennae short, stout, geniculate, with six joints measuring altogether 185–205 μ in length; apical joint with two falcate sensory setae; one falcate seta occurs on the preapical joint.

SOUTH AFRICA. Hexriver : July 1930, four mounted adult females collected on roots of an unknown plant (C. J. Joubert)—Coll. No. 2496.

Very close to *R. immsi* James but differs from it by the absence of the circulus and the small chitinized area about the setae of the anal lobe cerarii.

Ripersia speciosa sp. n.

(Plate 41)

Living adults not seen. Mounted specimens rather broadly elliptical in outline, up to 2·3 mm. long. Marginal cerarii recognizable on the last six abdominal segments only. Anal lobe cerarii each with four conical spines of different size, surrounded by a loose group of about 30 trilocular pores and three to four auxiliary setae ; area about the cerarian spines not chitinized. Preanal cerarii each with three spines, slightly smaller in size. All remaining cerarii carry two spines which tend to become progressively longer and more slender anteriorly. Each cerarius is beset by a few trilocular pores and is devoid of auxiliary setae. Ventral side of each anal lobe without chitinized bar ; the apical setae were all broken off in the specimens at hand ; subapical one 45–50 μ long. Multilocular disc pores arranged in two groups on the ventral side of the last abdominal segments as follows : (ix + x) 7–11 ; (viii) 4–8. Tubular ducts with oral rim set singly or in pairs in a fairly regular series along the dorsal and ventral marginal areas of the body ; a few more are scattered in no apparent pattern. Ventral tubular ducts of oral collar type set in loose transverse rows on the last five abdominal segments. Trilocular pores not numerous and uniformly distributed. Circular disc pores large, attaining the same size of the trilocular pores. They are fairly numerous on both surfaces of the body. Anterior and posterior dorsal ostioles inconspicuous with membranous lips. Circulus transversely elongate. Dorsal setae short, few ; ventral ones longer and more numerous. Legs all well developed ; hind tibia with a group of large translucent pores, having a heavily chitinized thick rim ; dimensions of legs (iii) : trochanter plus femur 260–270 μ ; tibia plus tarsus 305–315μ. Anal ring setae 100–110 μ. Beak 125–155 μ. Antennae small, not geniculate, of six joints, which together attain a length of 350–365 μ.

BELGIAN CONGO. Nyatja : October 1941, three mounted adult females collected on roots of *Coreopsis* sp. (F. L. Hendrick)—Coll. No. 1504.

Very closely allied to *R. glandulosa* James but differing from it in having two groups of multilocular disc pores and four and three spines on the anal and preanal cerarii respectively.

Spilococcus commiphorae sp. n.

(Plate 42)

Habit of living adults not recorded. Mounted specimens broadly to very broadly elliptical in outline ; length up to 2·8 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two robust conical spines surrounded by a loose group of about a dozen trilocular pores and five to seven auxiliary setae ; area about the cerarian spines not chitinized. All the remaining cerarii are provided with two spines, except the frontal (xvii) and ocular (xvi) cerarii which carry three, four or five spines, and the (xv) which occasionally has three spines. The spines are somewhat longer and more slender than those of the anal lobes and are beset by 3–8 trilocular pores ; area about the cerarian spines not chitinized ; auxiliary setae absent. Ventral side of each anal lobe with a well-marked elongate chitinized bar ; apical seta 210–240 μ ; subapical one 80–110 μ. Multilocular disc pores fairly numerous and arranged in transverse rows on the ventral side of the last five abdominal segments. The number of pores occurring on each segment could not be accurately ascertained because on the marginal area of the body the pores near the distal margin are not clearly separated from those set close to the basal margin of the preceding segment. A few more pores are scattered on the marginal area of the thorax and occasionally one or two pores occur on the dorsal side of the abdomen. Tubular ducts with oral rim somewhat variable in size, but always smaller in diameter than the multilocular disc pores. On the dorsal side of the postsoma the ducts are numerous and tend to be set in irregular transverse segmental rows ; on the prosoma they are much fewer and are widely scattered. Fairly numerous ducts occur on the venter, mostly along the marginal area. Tubular ducts with oral collar few and scattered on both surfaces of the body. Trilocular pores few and evenly distributed. Circular disc pores slightly smaller than the trilocular pores, few and scattered all over the body. Anterior and posterior dorsal ostioles inconspicuous. Circulus large, transversely elongate. Dorsal setae fairly numerous, stout ; ventral ones slender but longer. Legs all well developed without translucent pores on the hind pair ; dimensions of legs (iii) : trochanter plus femur 320–380 μ ; tibia plus tarsus 360–415 μ. Anal ring setae 140–170 μ. Beak 145–170 μ. Antennae with eight joints, except in two specimens in which one of the antennae was found with seven joints only ; the total length of the 8-jointed antennae is 490–630 μ.

South Africa. Zebedelia : 6.ii.1957, twelve mounted adult females collected on *Commiphora* sp. (G. De Lotto)—Coll. No. 2186.

Related to *S. perforatus* De Lotto, but easily distinguishable from it in having a complete series of seventeen pairs of marginal cerarii and eight joints to the antennae.

Spilococcus diversus sp. n.

(Plate 43)

Habit of living adults not recorded. Mounted specimens elongate to broadly elliptical in outline; length up to 2 mm. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each provided with two conical spines beset by a group of 30–40 trilocular pores and nine to ten auxiliary setae ; area about the cerarian spines not chitinized. The remaining cerarii carry two spines, except on the thorax and head where at times one or two of the cerarii have three—seldom four—spines. Each cerarius is surrounded by a few trilocular pores ; auxiliary setae absent.

The spines of the abdominal cerarii tend to become progressively smaller and more slender anteriorly; on the thorax and head they are even more slender but become longer, attaining the same size and shape of some of the dorsal body setae. Sometimes they tend to be widely apart from each other. Ventral side of each anal lobe with a small poorly marked chitinized bar; in one specimen the bar is entirely absent. Apical seta robust, 235–255 μ long; subapical one about 80 μ. Multilocular disc pores set in transverse segmental rows on the ventral side of the last five abdominal segments as follows: (ix + x) 23–33; (viii) 24–31; (vii) 11–19; (vi) 9–14; (v) 6–11. On all segments anterior to the genital opening the pores are arranged along the distal margin, except on the (viii) where a few pores occur near the basal margin. No multilocular pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts with oral rim very variable in number and arrangement; one to three ducts at times occur on the ventral marginal area of the thorax. Ventral tubular ducts with oral collar crowded near the marginal area of all abdominal segments and near each frontal cerarius (xvii). They are also associated with the multilocular disc pores. A few more are scattered on the thorax and head. Trilocular pores numerous on both surfaces of the body. Circular disc pores somewhat smaller than the trilocular ones and distributed on the dorsum and venter without any particular pattern. Anterior and posterior dorsal ostioles well developed with membranous lips. Circulus transversely elongate. Dorsal seta not numerous, rather robust; ventral ones longer and more slender. Legs all well developed; hind tibia with rather numerous minute translucent pores; dimensions of legs (iii): trochanter plus femur 285–345 μ; tibia plus tarsus 330–385 μ. Beak 125–135 μ long. Anal ring setae 135–145 μ. Antennae with eight joints measuring altogether 370–480 μ.

UGANDA. Kampala: 9.vi.1958, four mounted adult females collected on *Solanum* sp. (G. De Lotto)—Coll. No. 2366.

Other records on material not included in the type series are:

KENYA. Nairobi: 25.ii.1954 on roots of *Leonotis mollissima* Guerke (G. De Lotto).

UGANDA. North Bugisu: 27.ii.1957 on roots of *Dichrocephala integrifolia* D. C. (G. De Lotto).

Very close to *Pseudococcus erigeroni* James but easily separable from it by the presence in *diversus* of the circulus.

Spilococcus kajiadoensis sp. n.

(Plate 44)

Habit of living adult not recorded. Mounted holotype specimen elongate elliptical in outline, 2·5 mm. long. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each with two conical spines surrounded by numerous trilocular pores and eight to ten auxiliary setae; area about the cerarian spines not chitinized. Each of the remaining cerarii is provided with two spines which tend to become progressively smaller and more slender towards the anterior end; each cerarius is surrounded by a few trilocular pores but is devoid of auxiliary setae. Ventral side of each anal lobe without a chitinized bar; apical seta fairly robust, about 300 μ long; subapical one 90 μ. Multilocular disc pores set in five groups on the ventral side of the last abdominal segments as follows: (ix plus x) 60; (viii) 79; (vii) 54; (vi) 7; (v) 3. On the segments anterior to the genital opening the pores are arranged in transverse linear rows along the distal margin, except on the (viii) segment where a few occur near the basal margin. No multilocular pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts of oral rim type few. The marginal series occur singly near each abdominal cerarius anterior to the anal lobes and near each frontal (xvii) cerarius; the median series extends from the (viii) to (vi) abdominal segments. The submedian and submarginal series are present only on the first abdominal segments as shown in the accompanying figure. A few more ducts are scattered on the dorsal prosoma and on the ventral marginal area of the thorax. Ventral tubular ducts with oral collar crowded on the marginal area of all abdominal segments and extending in irregular transverse rows in association with the multilocular disc pores; a small group of ducts occurs on the head, close to each of the frontal cerarii (xvii). Trilocular pores fairly numerous and evenly distributed. Circular disc pores somewhat smaller than the trilocular ones, sparsely scattered on both surfaces of the body. Anterior dorsal ostioles inconspicuous; posterior ones fairly well developed; in both instances their lips are membranous. Circulus large, transversely elongate. Dorsal setae fairly long and slender; ventral ones slightly longer but somewhat stouter. Legs all well developed; hind tibia with many minute translucent pores; dimensions of legs (iii): trochanter plus femur 560 μ; tibia plus tarsus 660 μ. Anal ring setae 200 μ. Beak 175 μ. Antennae with eight joints, measuring together 715 μ in length.

KENYA. Kajiado: 30.vi.1957, one mounted adult female collected on *Croton* sp. (G. De Lotto)—Coll. No. 2204.

Other records are:

KENYA. Kiambu: 20.x.1929 on *Datura* sp. (R. H. Le Pelley). These specimens are in too poor a condition for their inclusion in the type series.

Resembling *Pseudococcus burnerae* Brain from which it differs in having much more numerous multilocular disc pores and dorsal tubular ducts with oral rim, and in the absence of a chitinized bar on the ventral side of the anal lobes.

Spilococcus limuricus sp. n.

(Plate 45)

Living adult not seen. Mounted specimen holotype rather elongate elliptical, 2·4 mm. long. Margin of the body with seventeen pairs of cerarii. Anal lobe cerarii each built up with two conical spines beset by several trilocular pores and about a dozen auxiliary setae; area about the cerarian spines not chitinized. The spines of all remaining cerarii are missing; from the number of the spine sockets it seems that each of the abdominal cerarii is formed with two spines, while on the thorax and head some of the cerarii are built up with three—seldom four—spines. On one side the (x) and (xi) cerarii are not recognizable. Each cerarius is surrounded by a group of about a dozen of trilocular pores, but devoid of auxiliary setae. Ventral side of each anal lobe without a chitinized bar ; apical seta of both anal lobes broken away ; subapical one 125 μ long. Multilocular disc pores arranged in transverse groups on the ventral side of the last three abdominal segments as follows : (ix + x) 46 ; (viii) 52 ; (vii) 32. Dorsal tubular ducts of oral rim type, few. Marginal series almost continuous from the penultimate abdominal segment as far as the frontal cerarius, except those near the (xi), (xii), (xiv) and (xv) cerarii which are missing ; submarginal, submedian and median series arranged rather irregularly as shown in the accompanying figure. A few ducts are scattered on the dorsal prosoma and on the ventral marginal area of the thorax. Ventral tubular ducts of oral collar type crowded on the marginal area of all abdominal segments ; a few more occur on the midregion of the last four abdominal segments anterior to the genital opening. Trilocular pores rather numerous and uniformly distributed. Circular disc pores noticeably smaller than the trilocular pores, they are not numerous and are scattered on both surfaces of the body. Anterior and posterior dorsal ostioles well developed with membranous lips. Circulus transversely elongate. Dorsal setae slender ; ventral ones longer and rather robust. Legs prominent ; hind tibia with a group of unusually large translucent pores which attain the same diameter or are slightly larger than the trilocular pores and are provided with a thick heavily chitinized rim ; dimensions of legs (iii) : trochanter plus femur 590 μ ; tibia plus tarsus 725 μ. Anal ring setae 180 μ. Beak 200 μ. Antennae with eight joints measuring altogether 790 μ.

KENYA. Limuru : 11.iii.1937, one mounted adult female collected on *Coffea arabica* L. (A. R. Melville)—Coll. No. 135.

This species bears a very close resemblance to *S. kajiadoensis* but departs from it in having the multilocular disc pores arranged in three groups instead of five as is the case of *kajiadoensis* ; in *limuricus* the translucent pores on the hind tibia are very large, while in *kajiadoensis* they are minute and without chitinized rims.

Spilococcus pusillus sp. n.

(Plate 46)

Habit of living adults not recorded. Mounted specimens elongate to very broadly oval in outline ; length up to 3·5 mm. Margin of the body with only ten pairs of cerarii, extending forwards from the anal lobes to the eleventh pair ; the tenth pair being absent. Each of the anal lobe cerarii carries two conical spines surrounded by 35–45 trilocular pores and three or four auxiliary setae ; area about the cerarian spines not chitinized. Each preanal cerarius bears two spines which become progressively smaller and more slender anteriorly and are beset by a few trilocular pores ; auxiliary setae absent. Ventral side of each anal lobe without chitinized bar ; apical seta robust 175–205 μ ; subapical one 60–70 μ. Multilocular disc pores set in transverse groups on the ventral side of the last seven abdominal segments as follows: (ix + x) 25–51; (viii) 34–64; (vii) 30–63; (vi) 39–67; (v) 25–54; (iv) 9–17; (iii) 6–13. On all segments anterior to the genital opening the pores are mostly crowded near the distal margin and a few occur close to the basal one. A few multilocular pores are scattered on the ventral median and submedian areas of the thorax. Dorsal tubular ducts of the oral rim type tend to be arranged in a median and submarginal series on the abdomen and thorax; a few are scattered on the head and on the ventral marginal area of the thorax. The number and arrangement of these ducts is very variable, and in some specimens not included in the type series they are occasionally entirely absent. Ventral tubular ducts with oral collar rather numerous and crowded on the marginal area of all abdominal segments and in association with the multilocular disc pores. A few are scattered on the thorax and head. Trilocular pores numerous on either surface of the body. Circular disc pores variable in size, the largest attaining the same size of the trilocular pores; they are distributed on both surfaces of the body. Anterior and posterior dorsal ostioles well developed with membranous lips. Circulus transversely elongate. Dorsal setae not numerous, rather short and robust; ventral ones longer and more slender. Legs all well developed with a few minute translucent pores on the hind tibia; dimensions of legs (iii): trochanter plus femur 255–305 μ; tibia plus tarsus 285–320 μ. Beak 135–155 μ. Anal ring setae 95–125 μ. Antennae with eight joints measuring altogether 350–400 μ in length.

KENYA. Nairobi: 6.viii.1959, seven mounted adult females collected on roots of *Bidens pilosa* L. (G. De Lotto)—Coll. No. 2479.

Other records on specimens not included in the type series are:

KENYA. Kakusi: March 1930 on roots of *Indigofera* sp. (T. W. Kirkpatrick); Nairobi: November 1940 on roots of *Solanum tuberosum* L. (R. H. Le Pelley); Nyeri: 4.iv.1951 on roots of *Ipomoea batatas* Poir (G. M. Lavers).

Closely related to *diversus* De Lotto but differing from it in having a reduced number of marginal cerarii and a larger number of multilocular disc pores.

Trionymus longipilosus sp. n.

(Plate 47)

Living adults not seen. Mounted specimens very broadly elliptical to nearly circular in outline; length up to 2·5 mm. Cerarii confined to a single pair on the anal lobes, each of which is formed with two conical spines surrounded by 10–12 trilocular pores and two to three auxiliary setae; area about the cerarian spines not chitinized. Ventral side of each anal lobe with an elongate chitinized bar; apical seta 255–315 μ long; subapical one 100–115 μ. Multilocular disc pores arranged in transverse rows on the ventral side of the last five abdominal segments as follows: (ix + x) 15–27; (viii) 16–25; (vii) 22–29; (vi) 19–27; (v) 9–16. No multilocular disc pores occur on the ventral prosoma or on the dorsum. Dorsal tubular ducts absent. Ventral tubular ducts with oral collar crowded all along the marginal area of the body and tending to become progressively fewer anteriorly; a few ducts are associated with the multilocular disc pores and scattered on the thorax and head. Trilocular pores not numerous and evenly distributed. Circular disc pores somewhat smaller than the trilocular pores, scattered on dorsum and venter. Anterior and posterior dorsal ostioles fairly prominent, with membranous lips. Circulus irregularly shaped, sometimes transversely elongate, sometimes rounded. Dorsal setae fairly numerous, very long and robust. From the penultimate abdominal segment as far as the head, pairs of robust very long setae are inserted along the margin of the body. The ventral setae are more slender and much shorter, not numerous. Legs all well developed, but rather short and stout ; claw without denticle ; translucent pores on hind legs entirely missing ; dimensions of legs (iii) : trochanter plus femur 255–285 μ ; tibia plus tarsus 255–275 μ. Anal ring entire with six setae measuring 125–160 μ. Beak 110–115 μ. Antennae constantly 8-jointed, measuring altogether 395–445 μ in length.

KENYA. Mombasa : 12–13.viii.1937, twenty-two mounted adult females collected on *Annona* sp. (A. R. Melville)—Coll. Nos. 139 and 141.

Other records are :

KENYA. Mombasa : 5.xi.1956 on *Peliostigma thonningii* (Schum.) H. Redhead (R. H. Le Pelley).

Trionymus pygmaeus sp. n.

(Plate 48)

Habit of living adults not recorded. Mounted specimens broadly to very broadly elliptical in outline ; length up to 1·5 mm. Margin of the body with five—occasionally six—pairs of cerarii occurring on the last abdominal segments. Anal lobe cerarii each built up with two conical spines beset by 15–25 trilocular pores and two to four auxiliary setae ; area about the spines not chitinized. Spines of the remaining cerarii tend to be more slender and on the most anterior pair they are at times set somewhat apart from each other ; the spines are beset by a few trilocular pores, but the auxiliary setae are missing. Ventral side of each anal lobe without a chitinized bar ; apical seta 205–225 μ ; subapical one 60–70 μ. Multilocular disc pores arranged in four groups on the ventral side of the last abdominal segments as follows : (ix + x) 34–39 ; (viii) 43–58 ; (vii) 26–43 ; (vi) 6–11. Dorsal tubular ducts entirely absent. Ventral tubular ducts of oral collar type not numerous and crowded on the marginal area of the last three or four abdominal segments ; a few ducts are associated with the multilocular disc pores. Trilocular pores fairly numerous and uniformly distributed. Circular disc pores noticeably smaller than the trilocular pores, few in number. Anterior and posterior dorsal ostioles inconspicuous, with membranous lips. Circulus absent. Dorsal setae fairly robust ; ventral ones slender and somewhat longer. Legs all well developed without translucent pores ; dimensions of legs (iii) : trochanter plus femur 205–220 μ ; tibia plus tarsus 220–235 μ. Anal ring setae 95–105 μ. Beak 135–145 μ long. Antennae with seven joints, except in one specimen in which one antenna has five, and the other six, joints ; the total length of 7-jointed antennae is 285–315 μ.

KENYA. Nairobi : 16.xii.1955 and 31.v.1956, three mounted adult females collected on roots of *Themeda triandra* Forsk. (G. De Lotto)—Coll. Nos. 1900 and 2030.

Close to *Ripersia hypoestis* James from which it differs by the absence of the circulus and in having a larger number of multilocular disc pores.

Trionymus viator sp. n.

(Plate 49)

Living adult not seen. Outline of the holotype specimen elongate elliptical, 1·9 mm. long. Margin of the body with two pairs of cerarii only. Anal lobe cerarii each with two robust conical spines surrounded by seven to eight auxiliary setae and a loose group of about 50 trilocular pores ; area about the cerarian spines not chitinized. Preanal cerarii similar to those of the anal lobes but devoid of auxiliary setae. Ventral side of each anal lobe without a chitinized bar ; apical seta 160 μ long ; subapical one 30 μ. Multilocular disc pores arranged in four groups on the ventral side of the last abdominal segments as follows : (ix + x) 33 ; (viii) 61 ; (vii) 39 ; (vi) 7. Two or three more multilocular pores occur on the dorsal side of the penultimate and antepenultimate abdominal segments. Dorsal tubular ducts with oral rim distributed in a marginal and median series from the penultimate abdominal segment as far as the head. On the head, thorax and first abdominal segments some ducts are interspersed between the two series. A few more occur on the ventral marginal areas of the thorax and abdomen. Tubular ducts with oral collar of three different sizes. The largest ones are very numerous and are crowded on the ventral marginal area of the abdomen, extending in transverse irregular rows on the (iv) to (vii) abdominal segments ; small groups of pores also occur on the ventral marginal area of the thorax and head. On the dorsal surface a large number of ducts are arranged in groupings on the thorax as shown in the accompanying figure. The ducts of median size are distributed over the ventral midregion of the abdomen ; a few occur on the dorsal side of the penultimate and antepenultimate abdominal segments. The smallest ducts are few and are intermingled with the largest ones on the marginal area of the abdomen. Trilocular pores fairly numerous and evenly distributed. Circular disc pores much smaller than the trilocular ones, few and scattered on both surfaces of the body. Anterior and posterior dorsal ostioles well developed, with membranous lips. Circulus absent. Dorsal setae few, small ; ventral ones more numerous, somewhat longer. Legs all well developed; hind tibia with a grouping of small translucent pores ; dimensions of legs (iii) : trochanter plus femur 335 μ ; tibia plus tarsus 365 μ. Anal ring setae 125 μ. Beak 145 μ long. Antennae with eight joints with a pseudoarticulation on the apical one ; total length 480 μ.

KENYA. Nairobi : 22.iii.1941, one adult mounted female intercepted from South Africa on *Pyrus malus* L. (R. H. Le Pelley)—Coll. No. 1494.

This species is closely allied to *T. lounsburyi* (Brain) but differs from it in the presence of large groupings of tubular ducts with oral collar on the dorsal side of the thorax.

The holotype and paratype specimens used for the description of the new Pseudococcidae dealt with in this paper have been deposited as follows :

	Type series	B.M.*	U.S.A.	S.A.	E.S.	S.A.L.
Allococcus aberiae	19	8	4	—	—	7
A. meridionalis	3	1	—	—	1	1
Cataenococcus hypogeus	11	5	3	—	—	3
C. jasmini	10	4	2	—	—	4
Dysmicoccus mollis	10	4	2	—	—	4
Eurycoccus glomerulus	9	4	2	—	—	3
Natalensia nana	3	1	1	—	—	1
Phenacoccus alienus	7	2	1	2	—	2
P. trionymoides	13	6	3	—	—	4
Planococcus crassus	10	4	2	—	—	4
P. flagellatus	7	3	1	—	—	3
P. formosus	1	1	—	—	—	—
P. hospitus	1	1	—	—	—	—
P. nigritulus	15	6	3	—	—	6
Pseudococcus bruguierae	1	1	—	—	—	—
P. cryophilus	22	10	5	—	—	7
P. occiduus	11	4	2	—	—	5
P. percrassus	2	1	—	—	—	1
P. pulcherrimus	8	3	2	—	—	3
P. spinulosus	3	1	1	—	—	1
Rhizoecus perprocerus	4	1	1	—	1	1
Ripersia speciosa	3	2	—	—	—	1
Spilococcus commiphorae	12	4	2	2	—	4
S. diversus	4	2	1	—	—	1
S. kajiadoensis	1	1	—	—	—	—
S. limuricus	1	1	—	—	—	—
S. pusillus	7	3	1	—	—	3
Trionymus longipilosus	22	10	5	—	—	7
T. pygmaeus	3	1	1	—	—	1
T. viator	1	1	—	—	—	—

* B.M. = British Museum (Natural History), London. Inclusive of holotype.
U.S.A. = U.S. National Collection of Coccidae, Washington, D.C.
S.A. = South African National Collection of Insects, Pretoria.
E.S. = Elsenburg-Stellenbosch Agricultural College, Stellenbosch, South Africa.
S.A.L. = Scott Agricultural Laboratories, Nairobi, Kenya.

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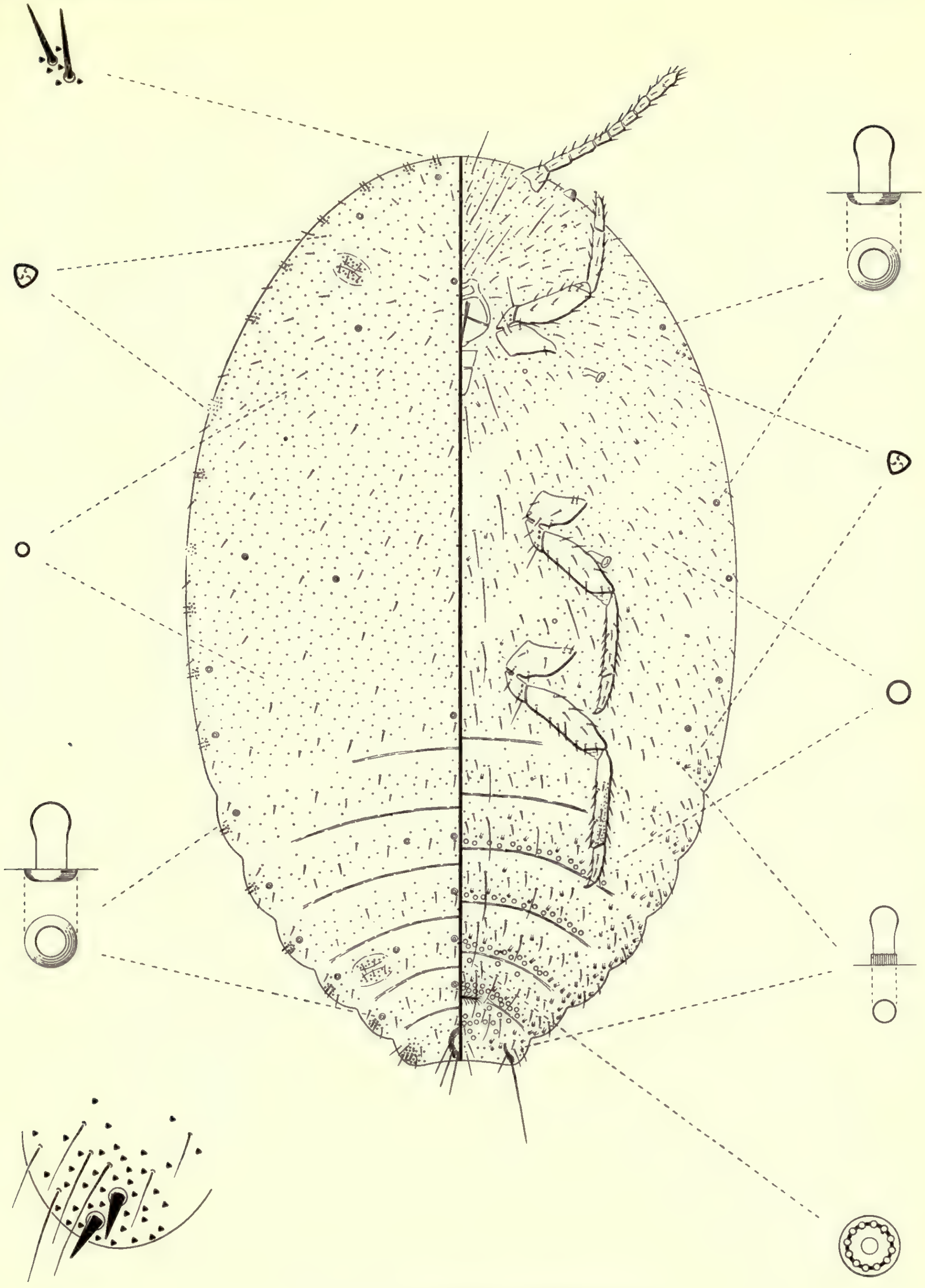


PLATE 20. *Allococcus aberiae* sp. n.

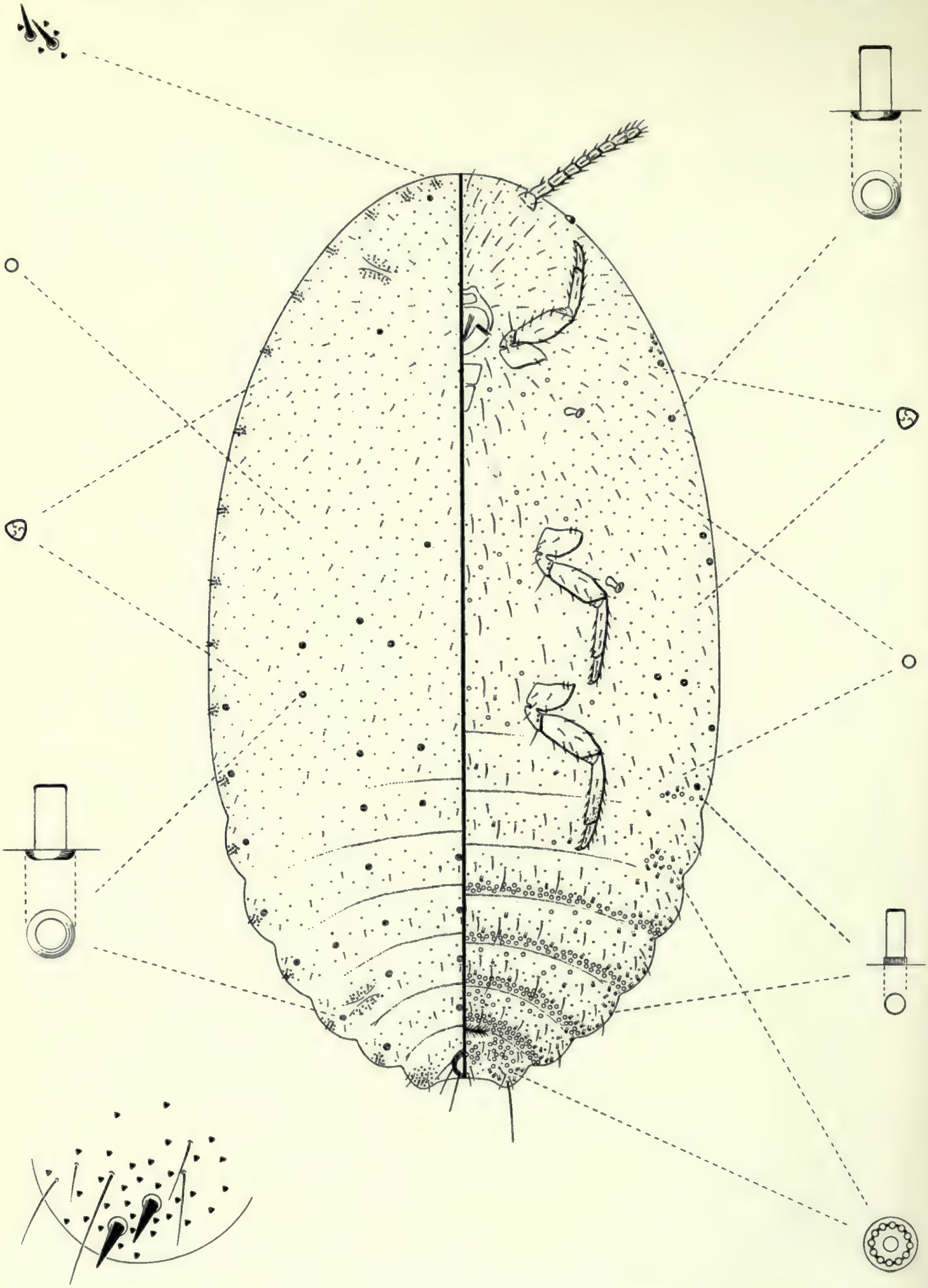


Plate 21. *Allococcus meridionalis* sp. n.

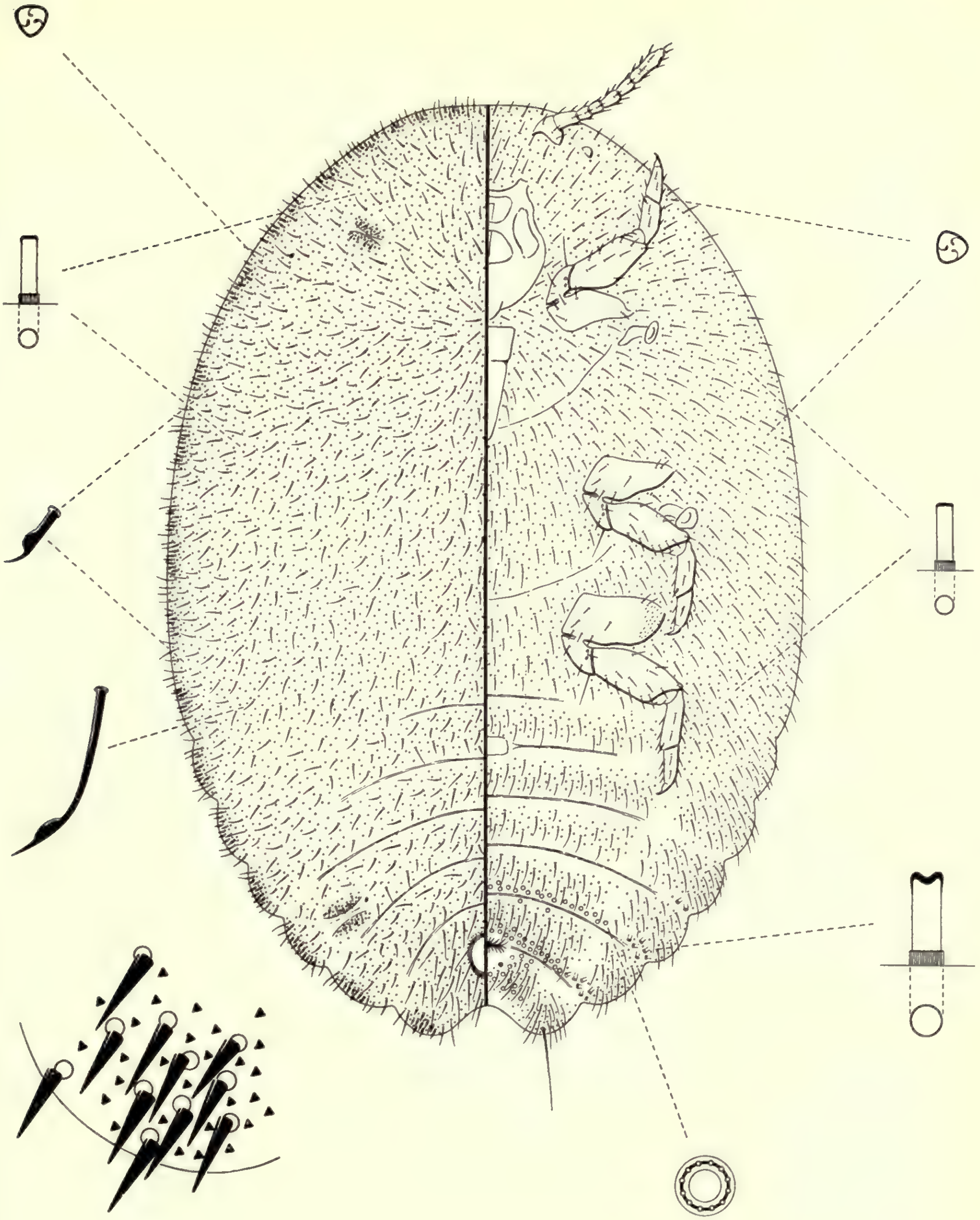


Plate 22. *Cataenococcus hypogeus* sp. n.

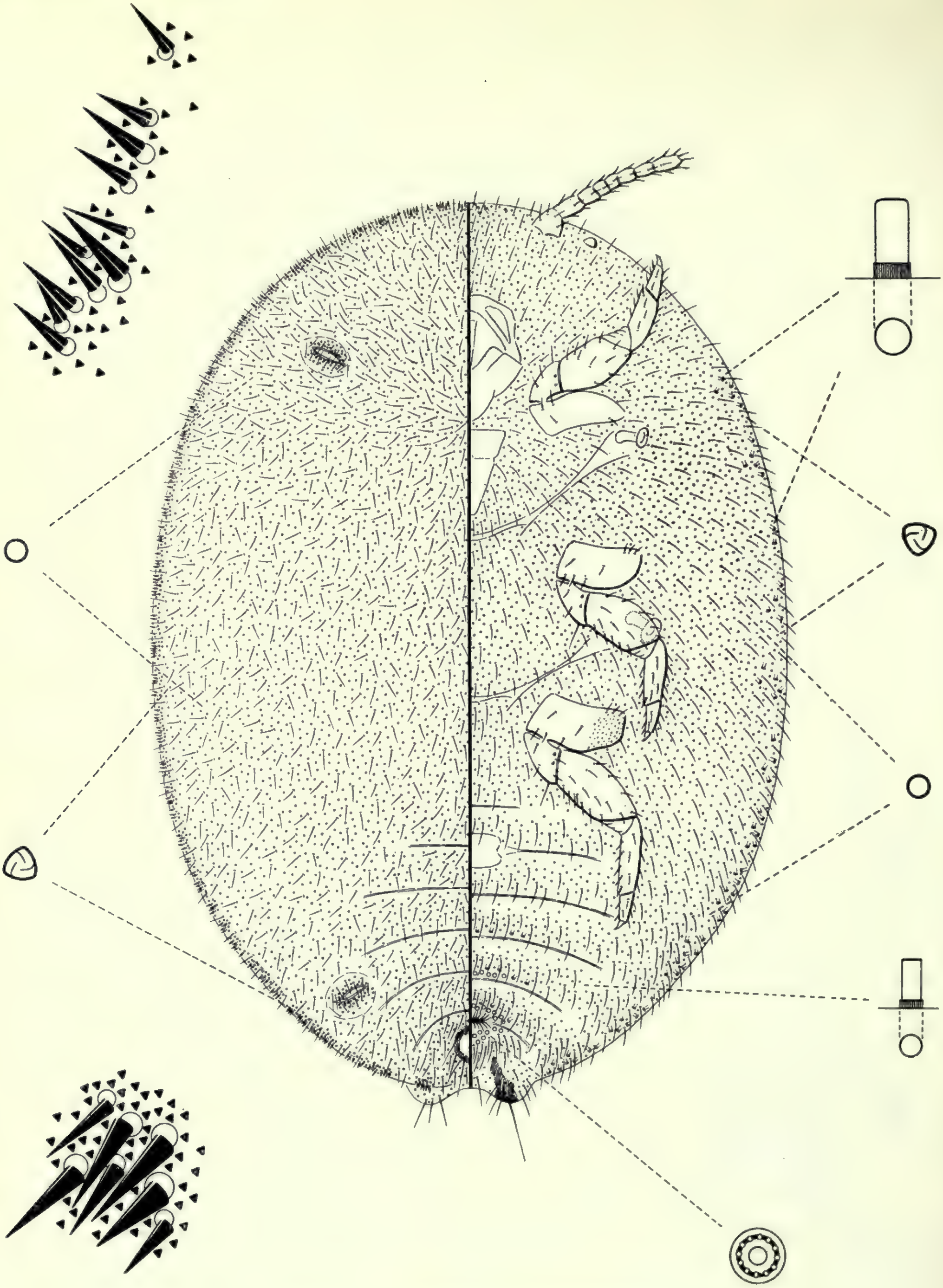


Plate 23. *Cataenococcus jasmini* sp.n.

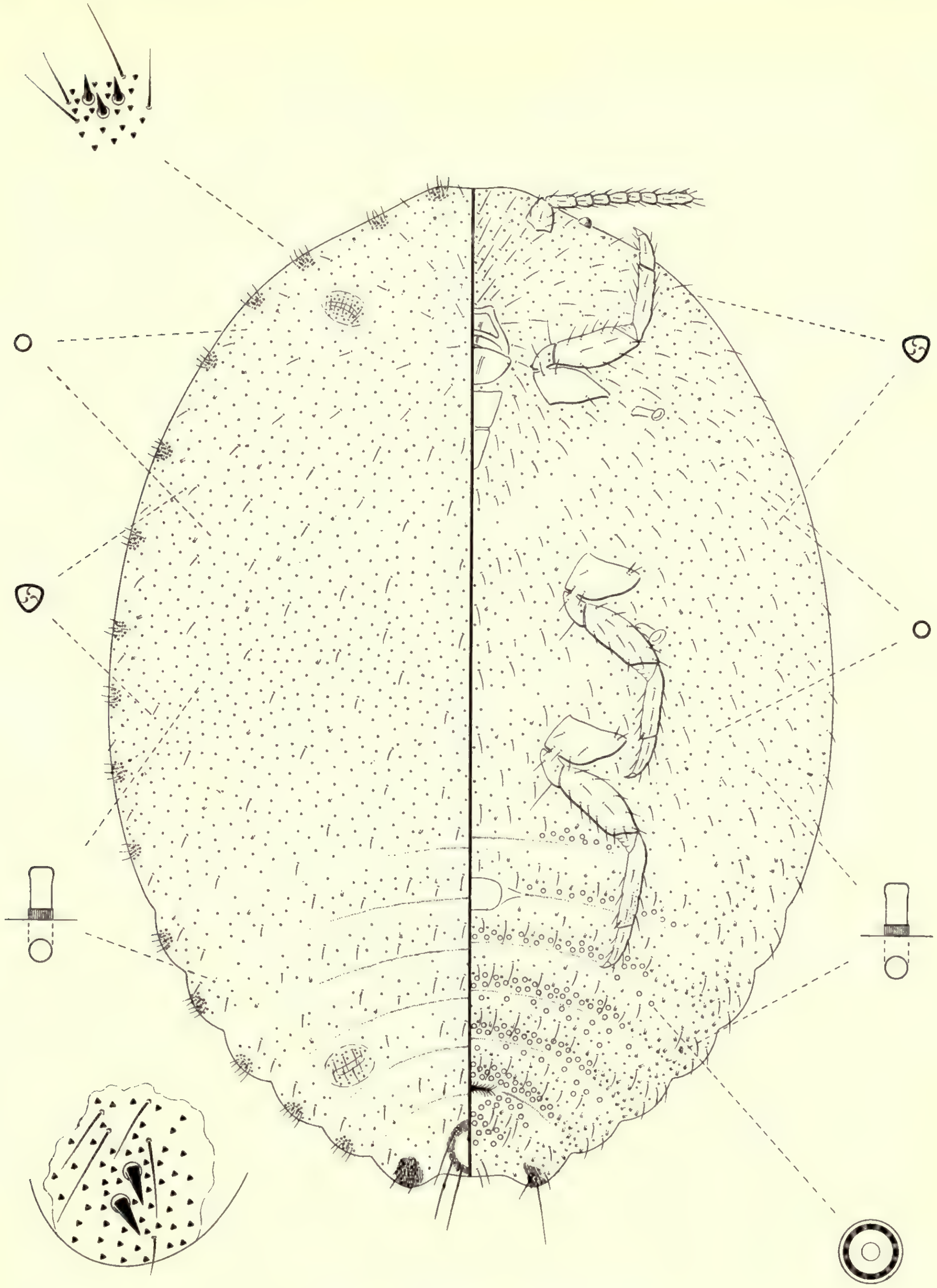


Plate 24. *Dysmicoccus mollis* sp. n.

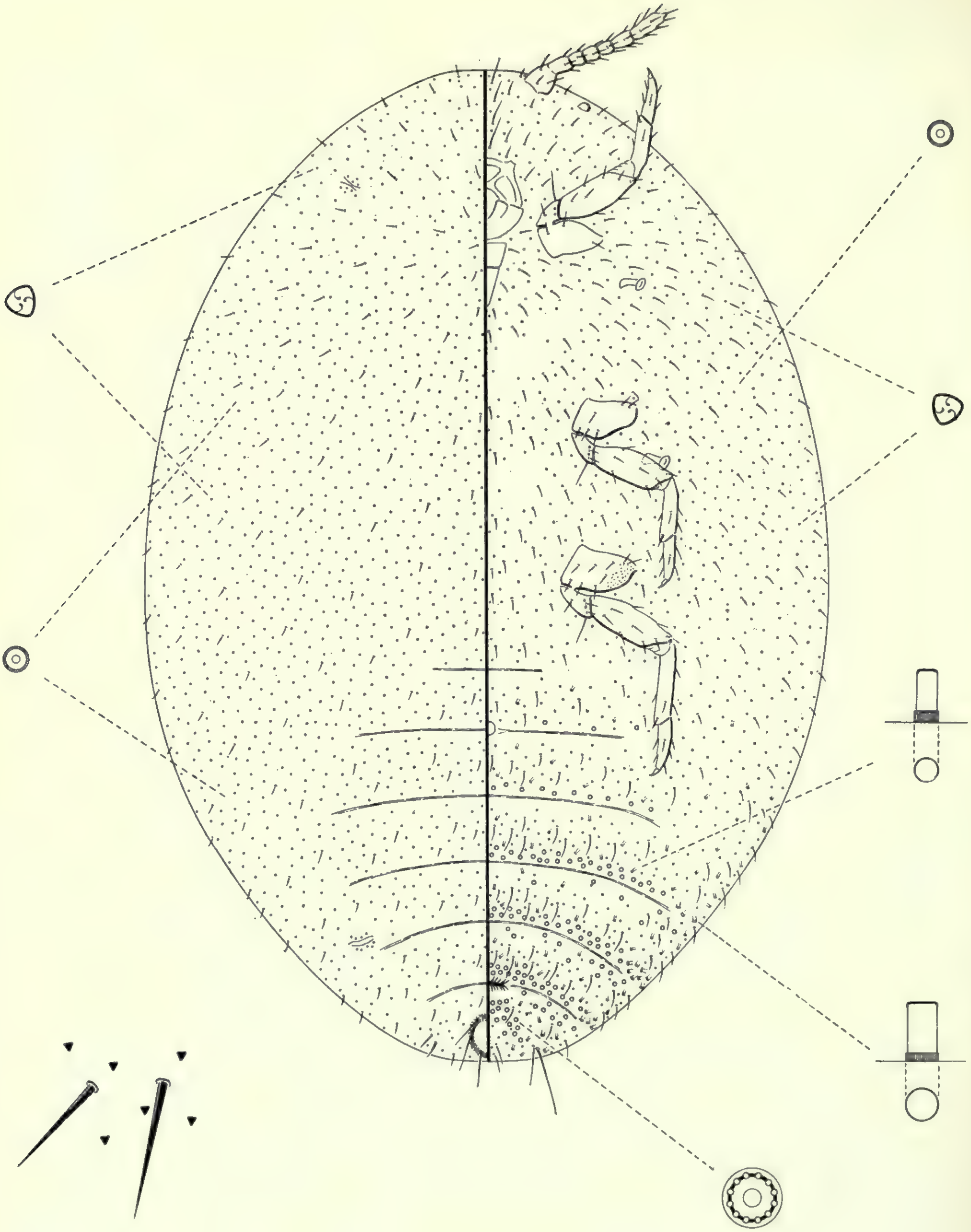
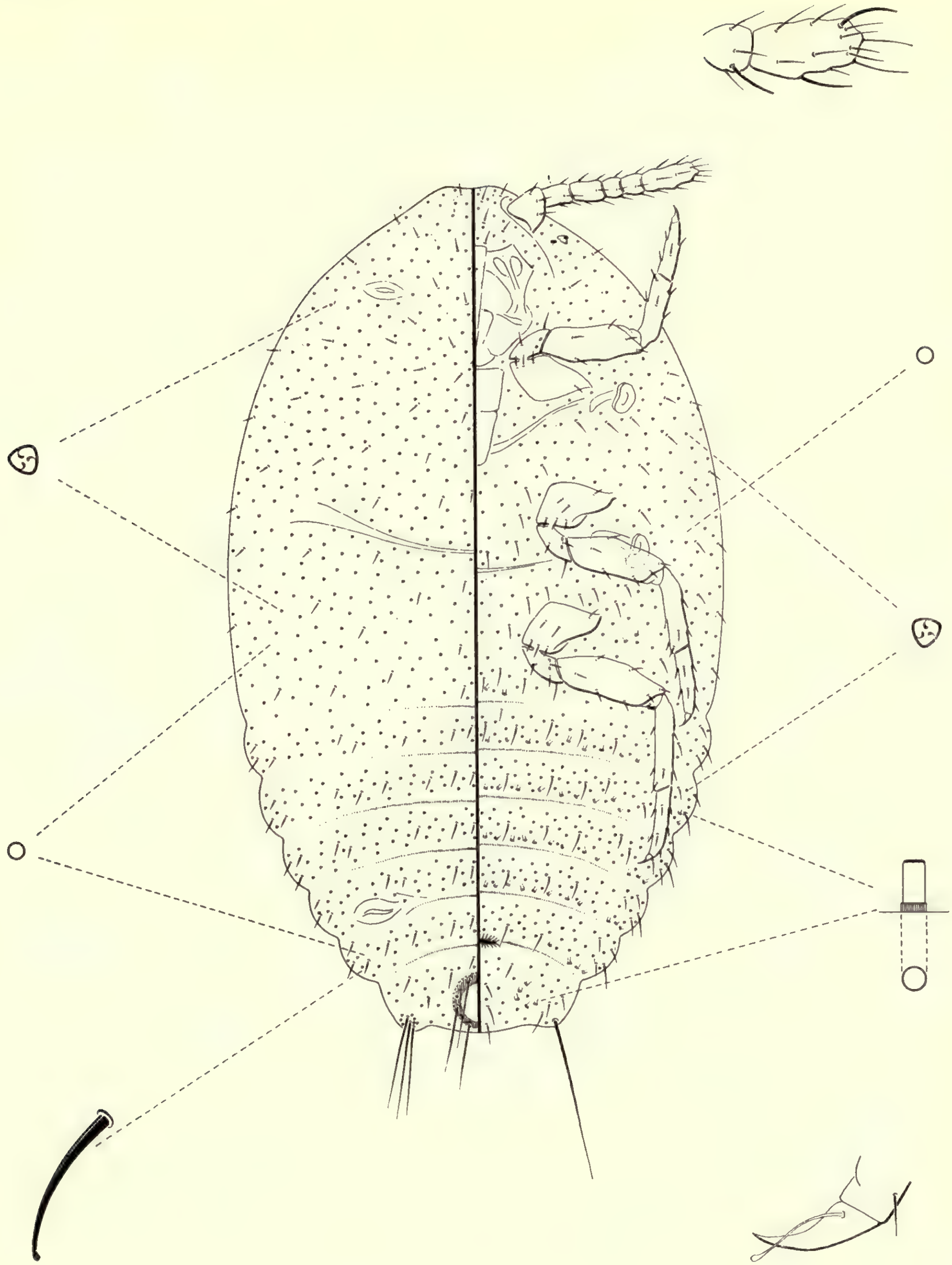


Plate 25. *Eurycoccus glomerulus* sp. n.



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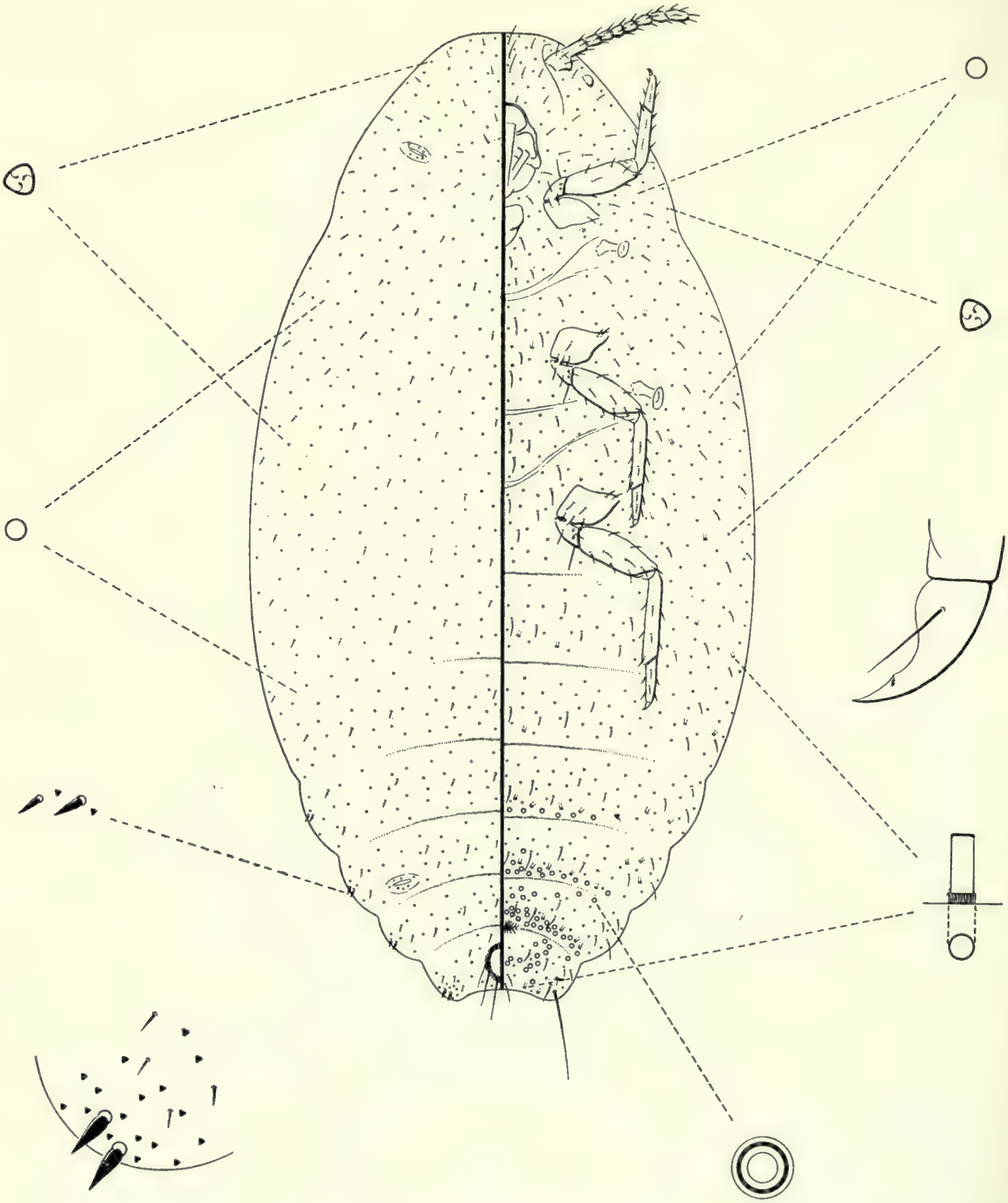


Plate 27. *Phenacoccus alienus* sp. n.

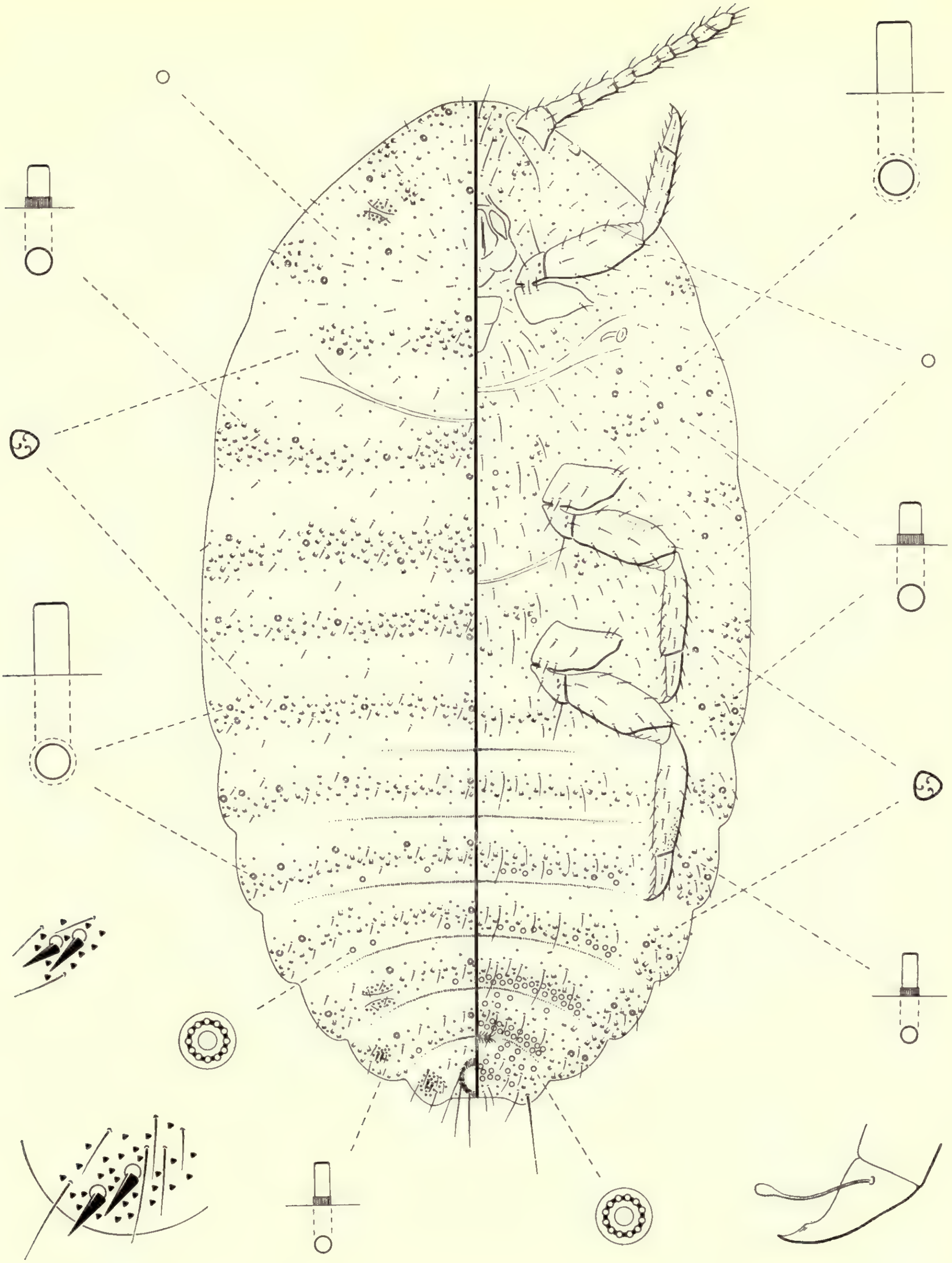


Plate 28. *Phenacoccus trionymoides* sp. n.

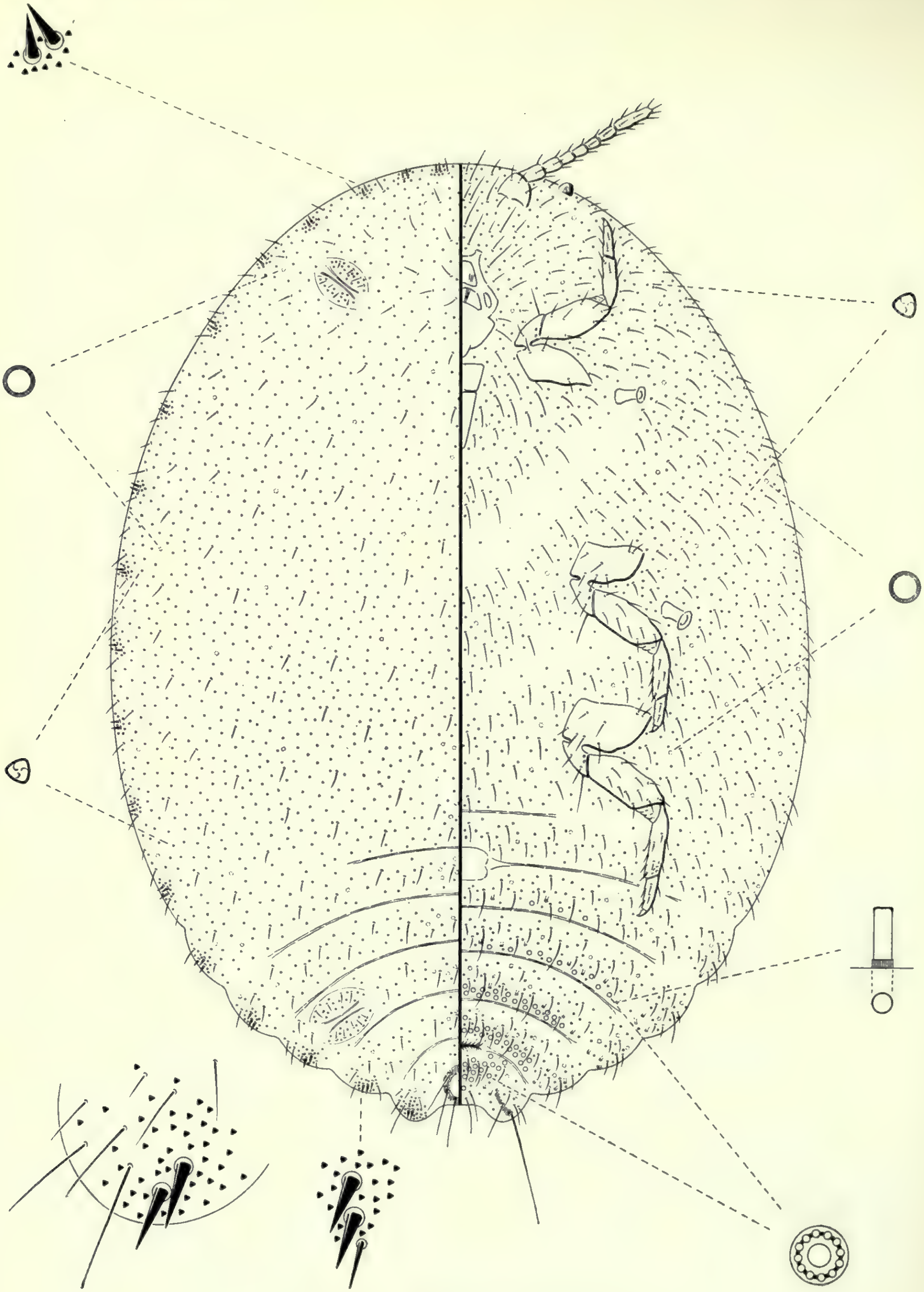


Plate 29. *Planococcus crassus* sp. n.

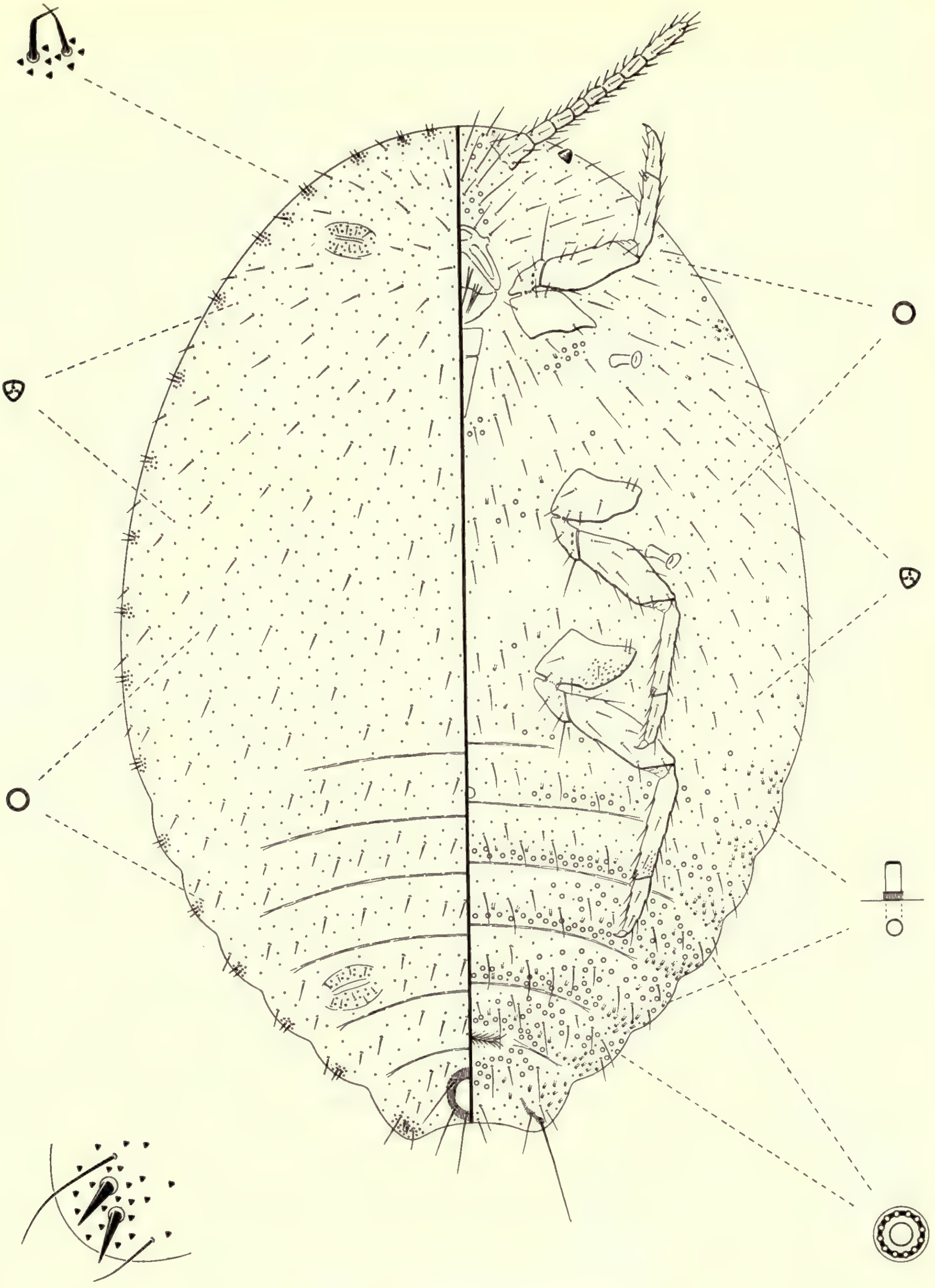
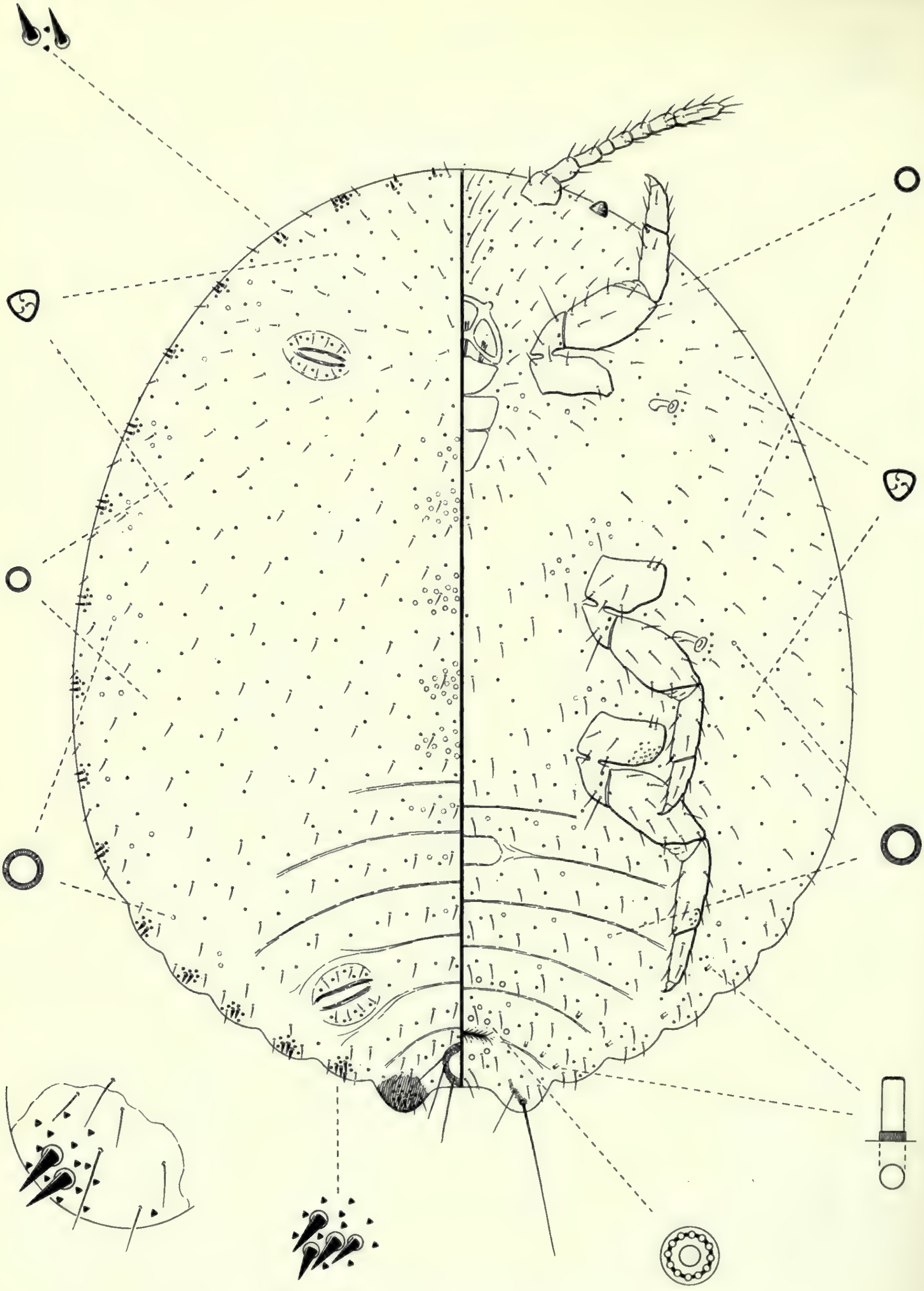


Plate 30. *Planococcus flagellatus* sp. n.



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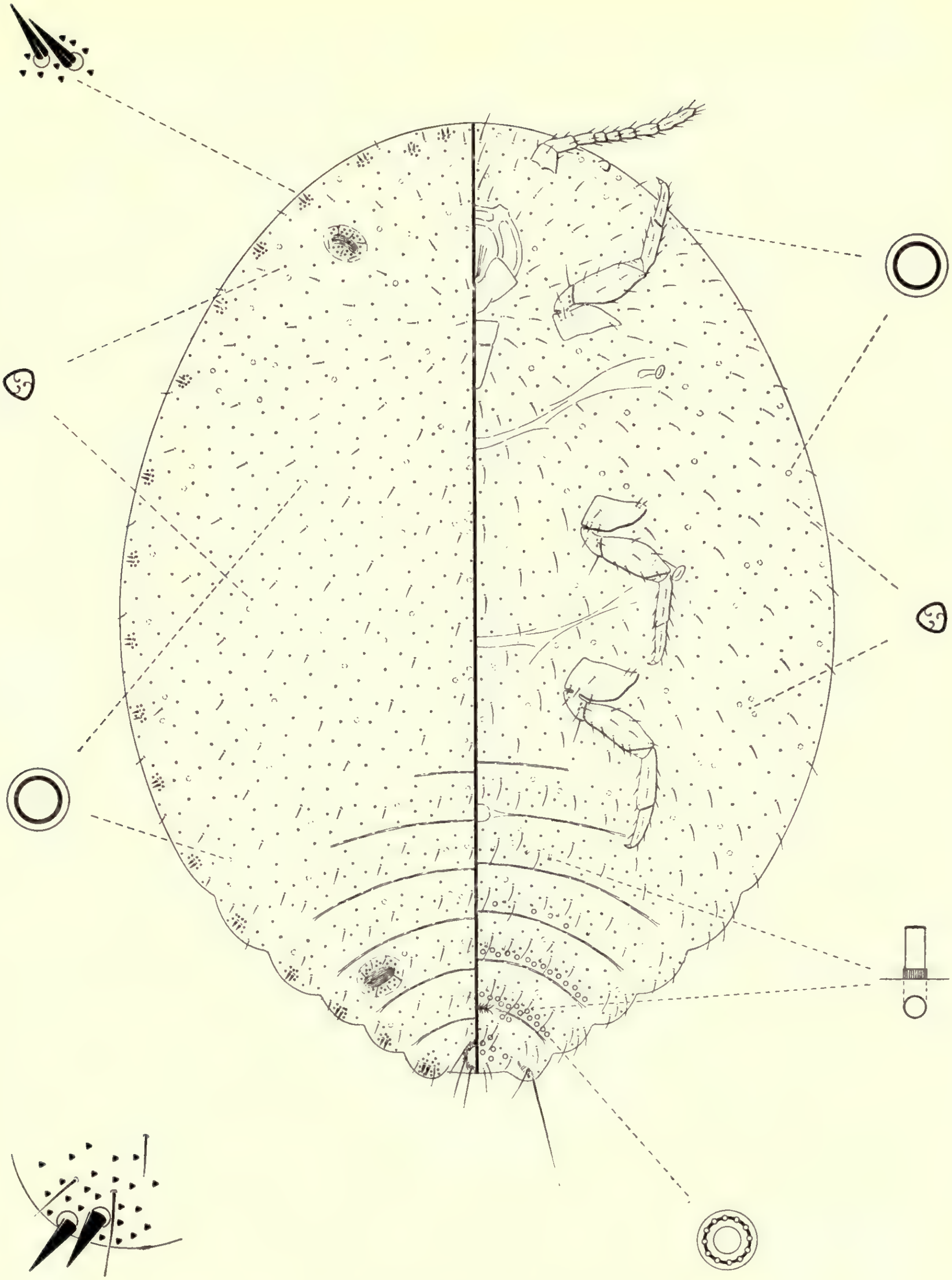

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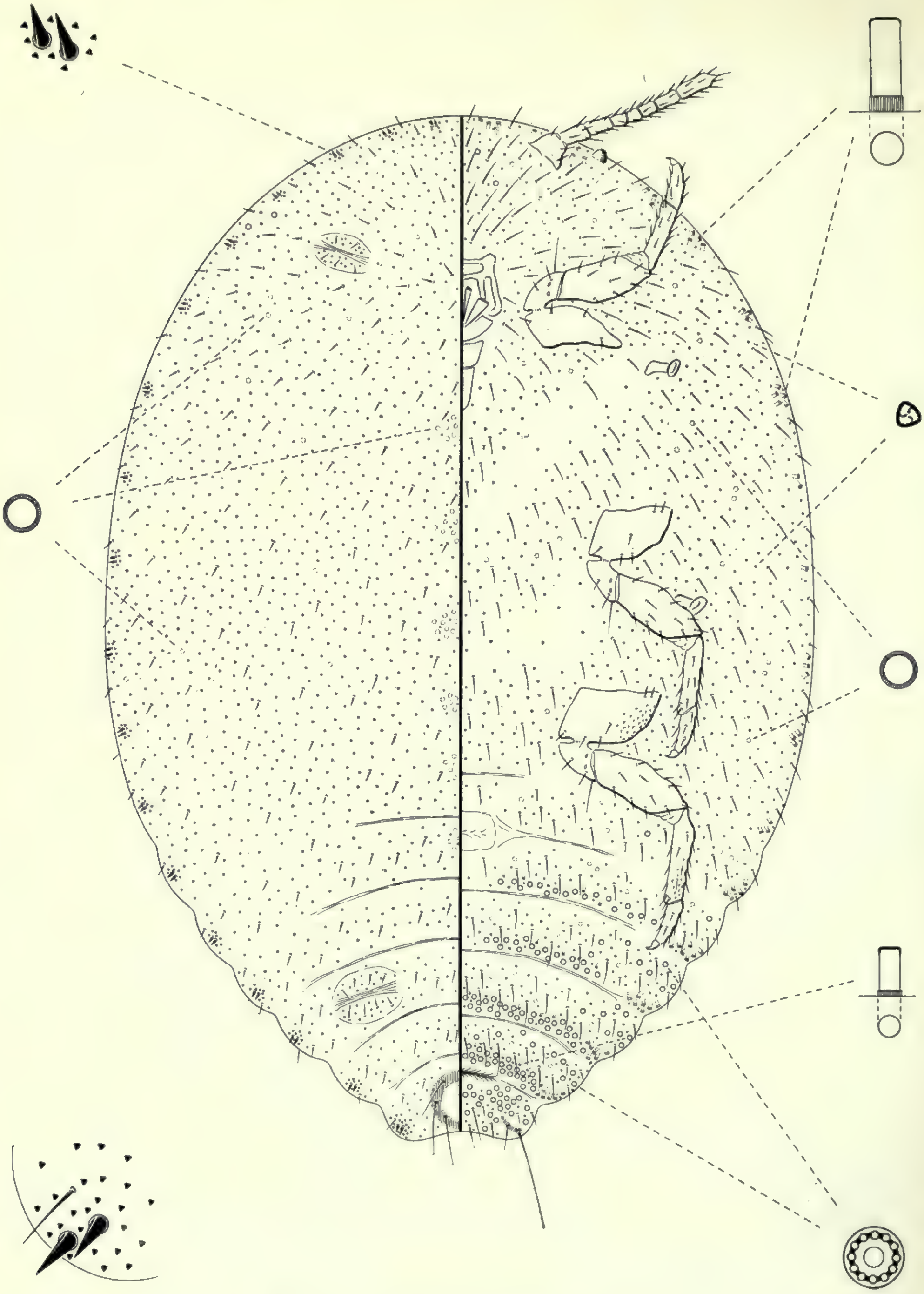

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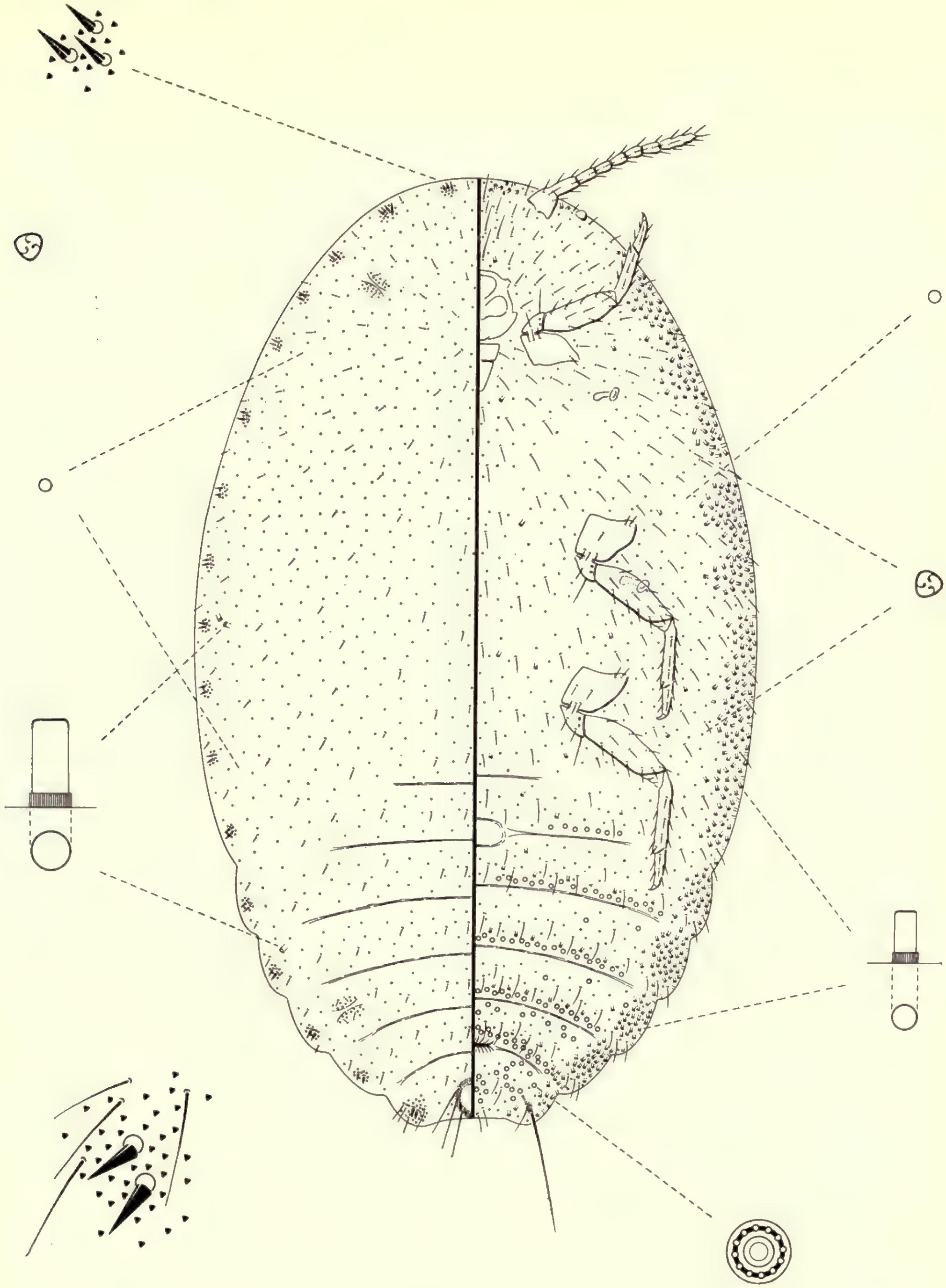
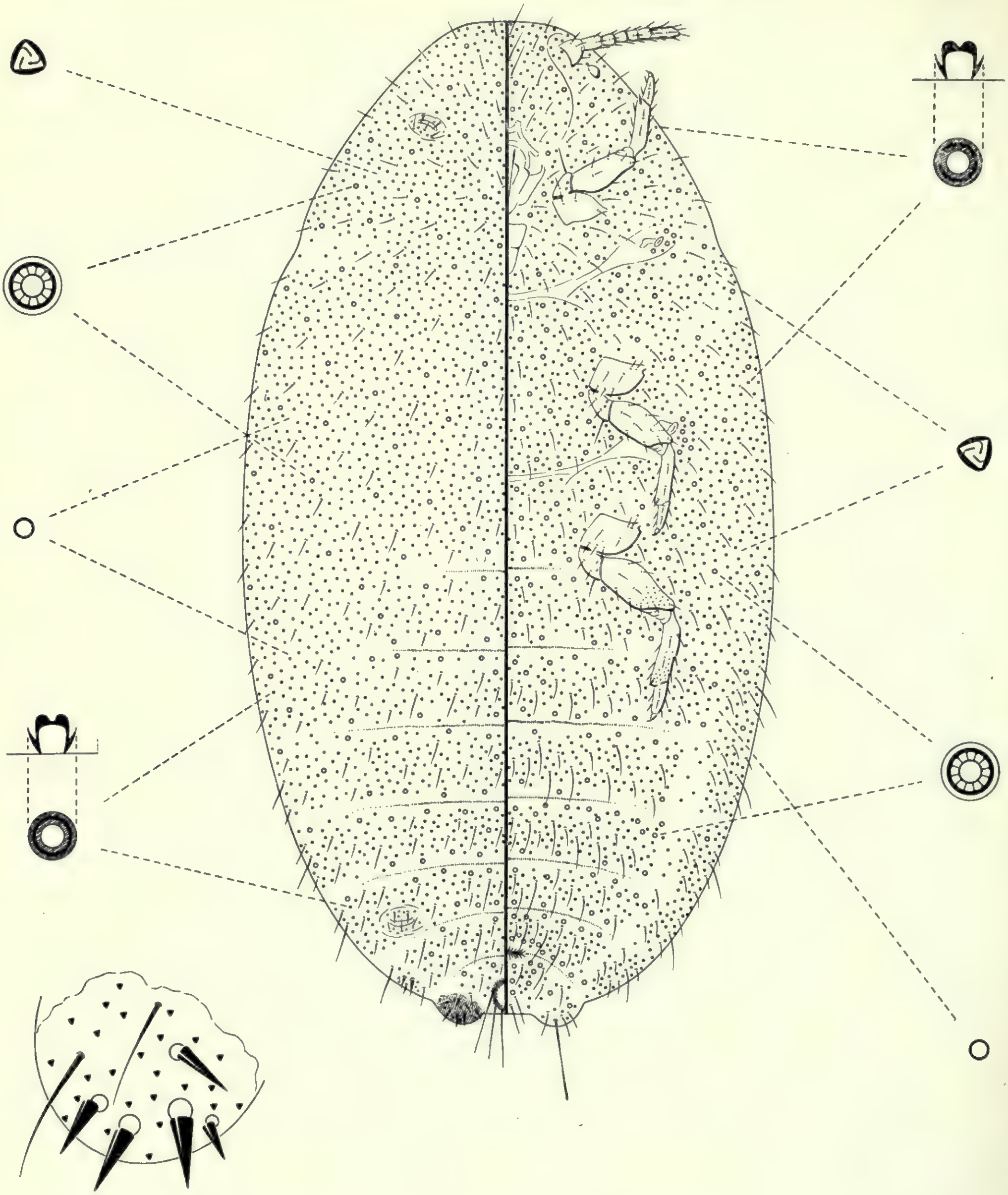


Plate 34. *Pseudococcus bruguierae* sp. n.



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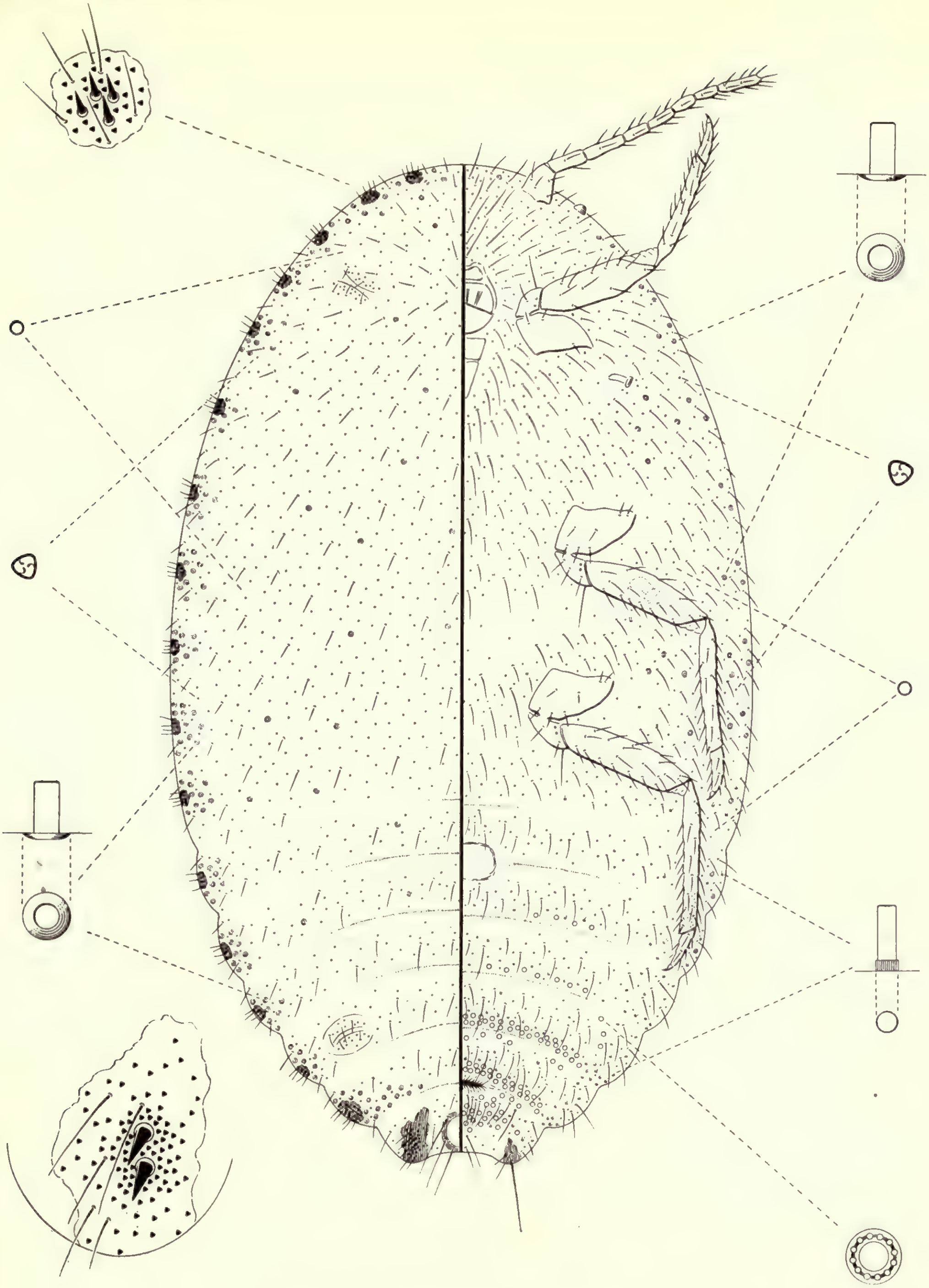

Plate 36 *Pseudococcus occiduus* sp. n.

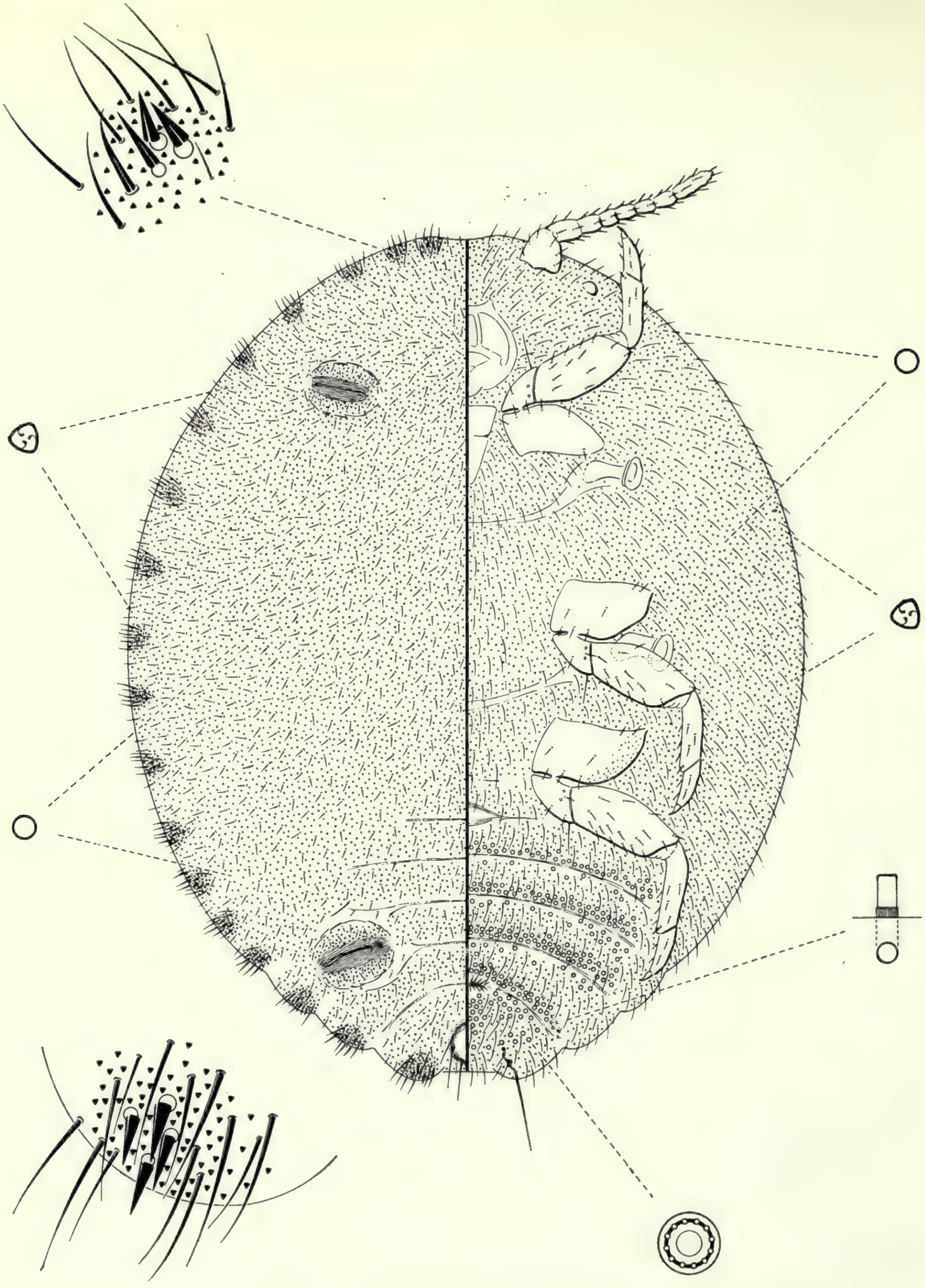

Plate 37 *Pseudococcus percrassus* sp. n.

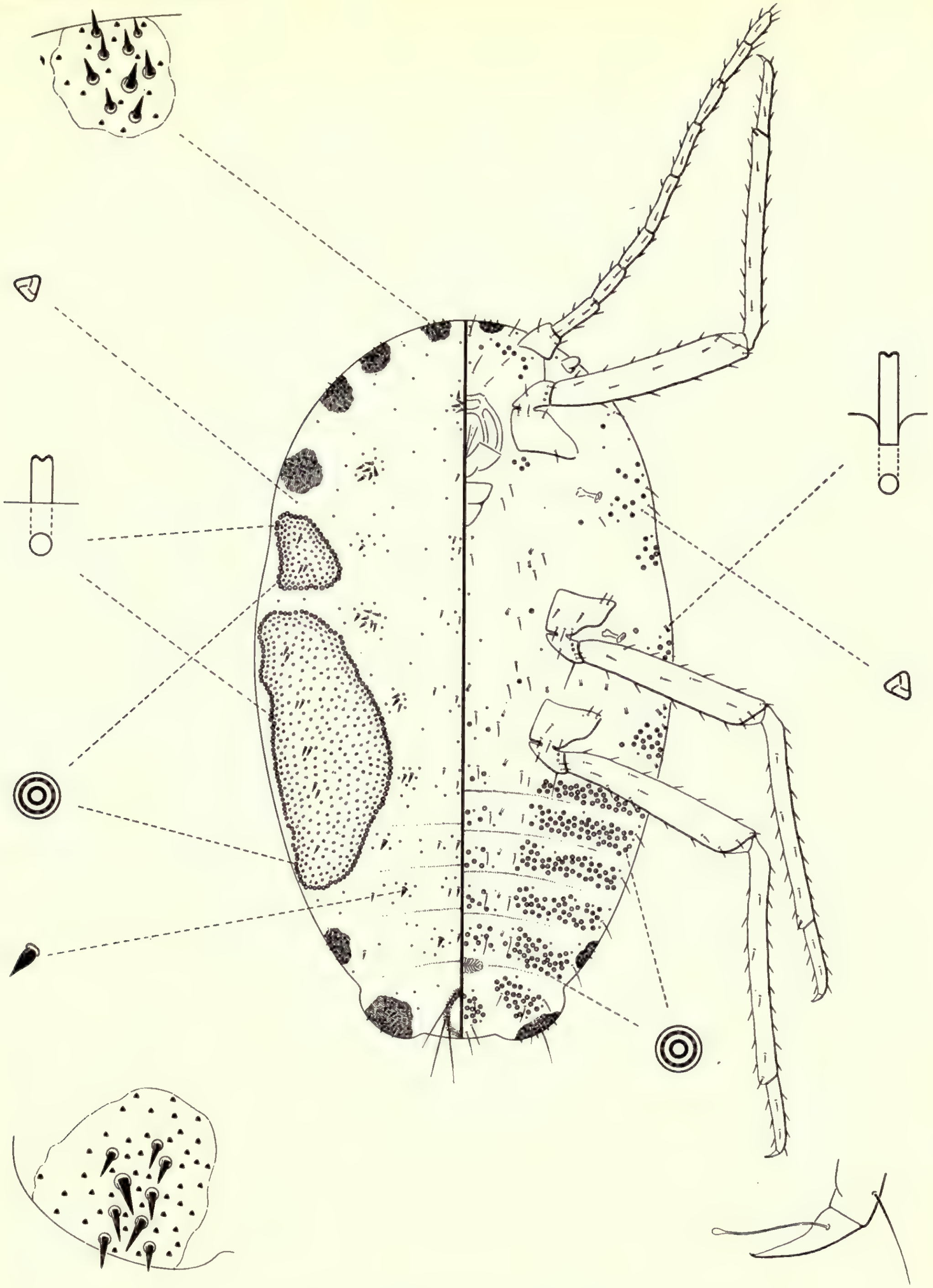

Plate 38. *Pseudococcus pulcherrimus* sp. n.

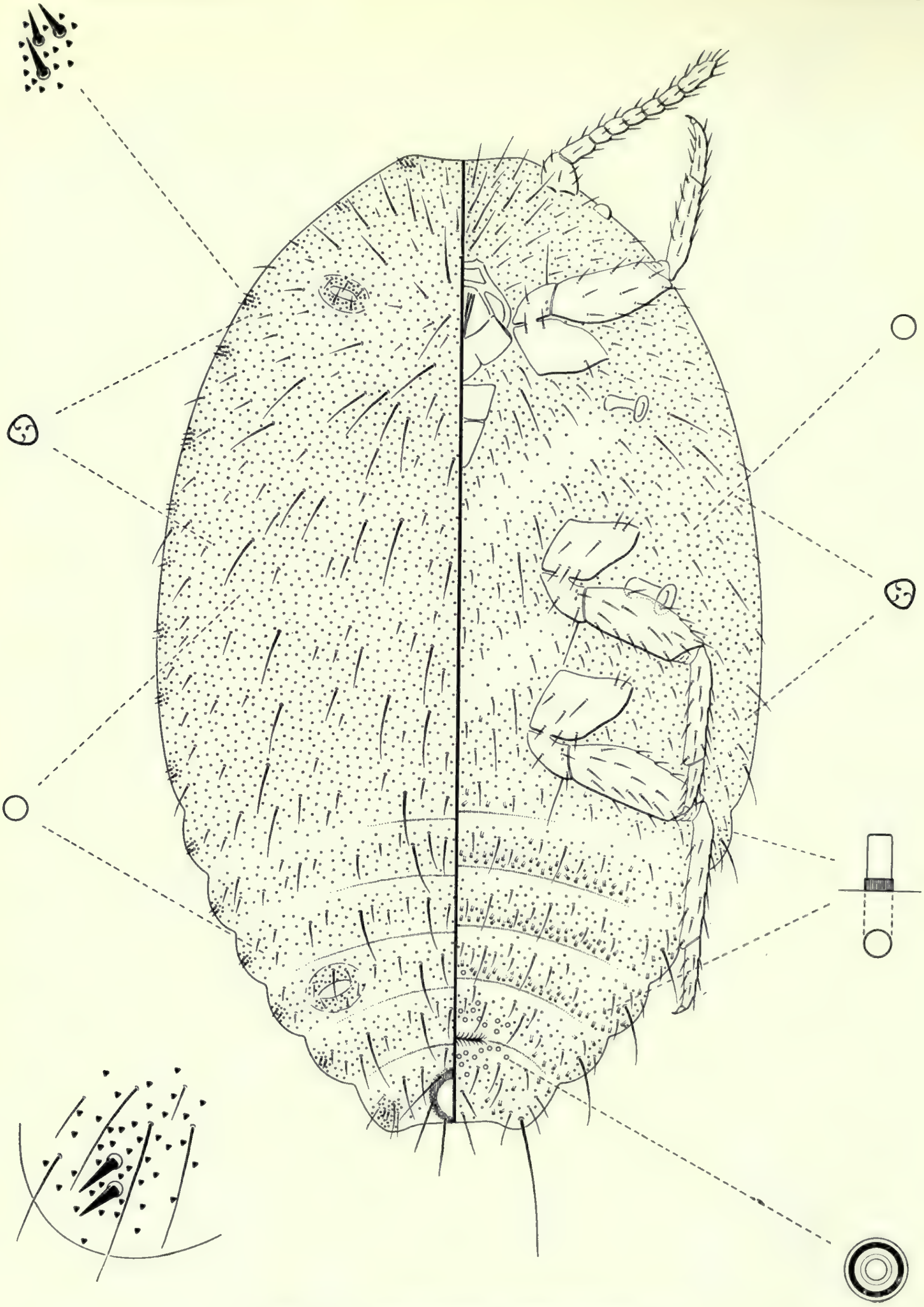

Plate 39. *Pseudococcus spinulosus* sp. n.

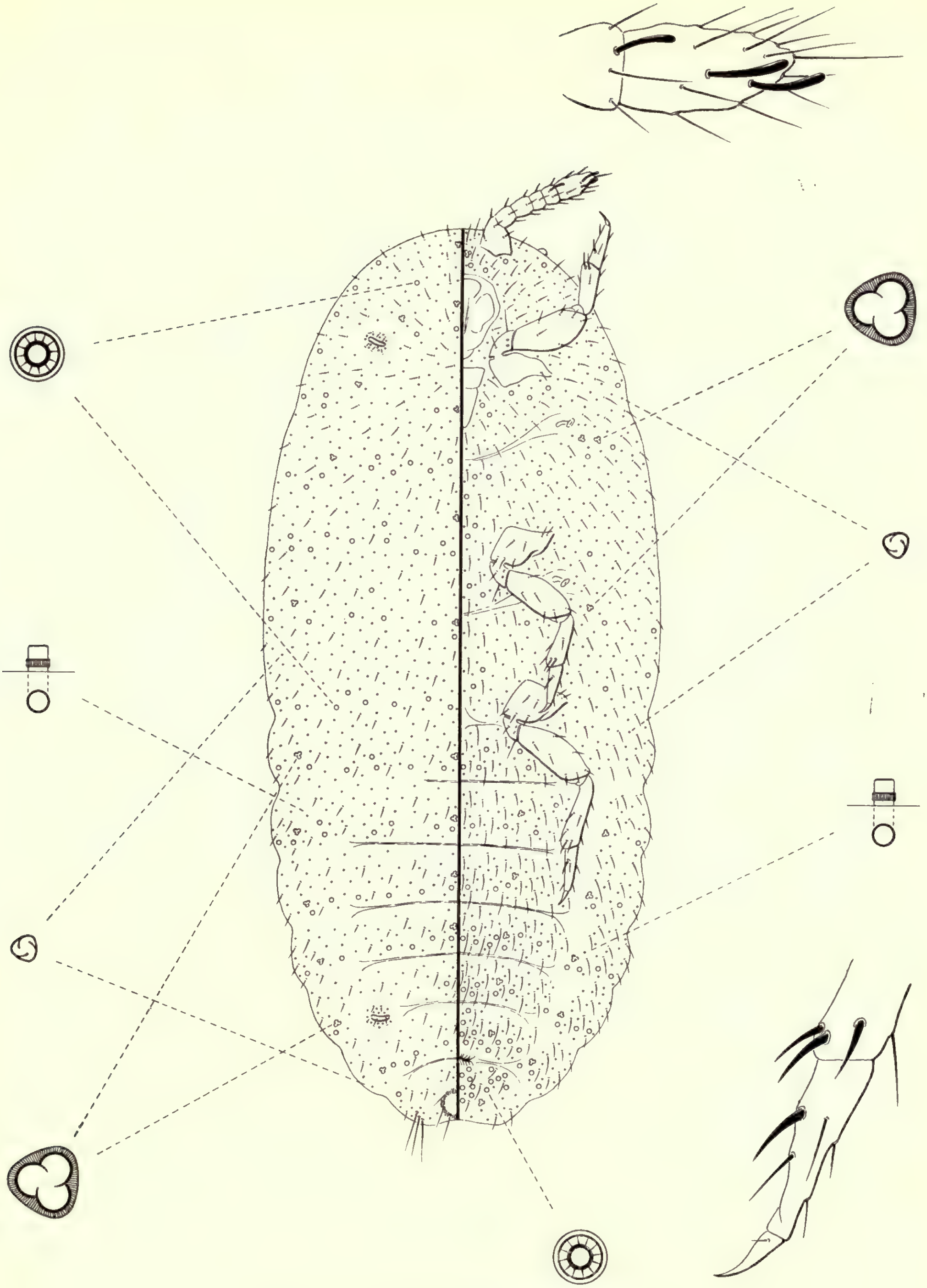

Plate 40. *Rhizoecus perprocerus* sp. n.

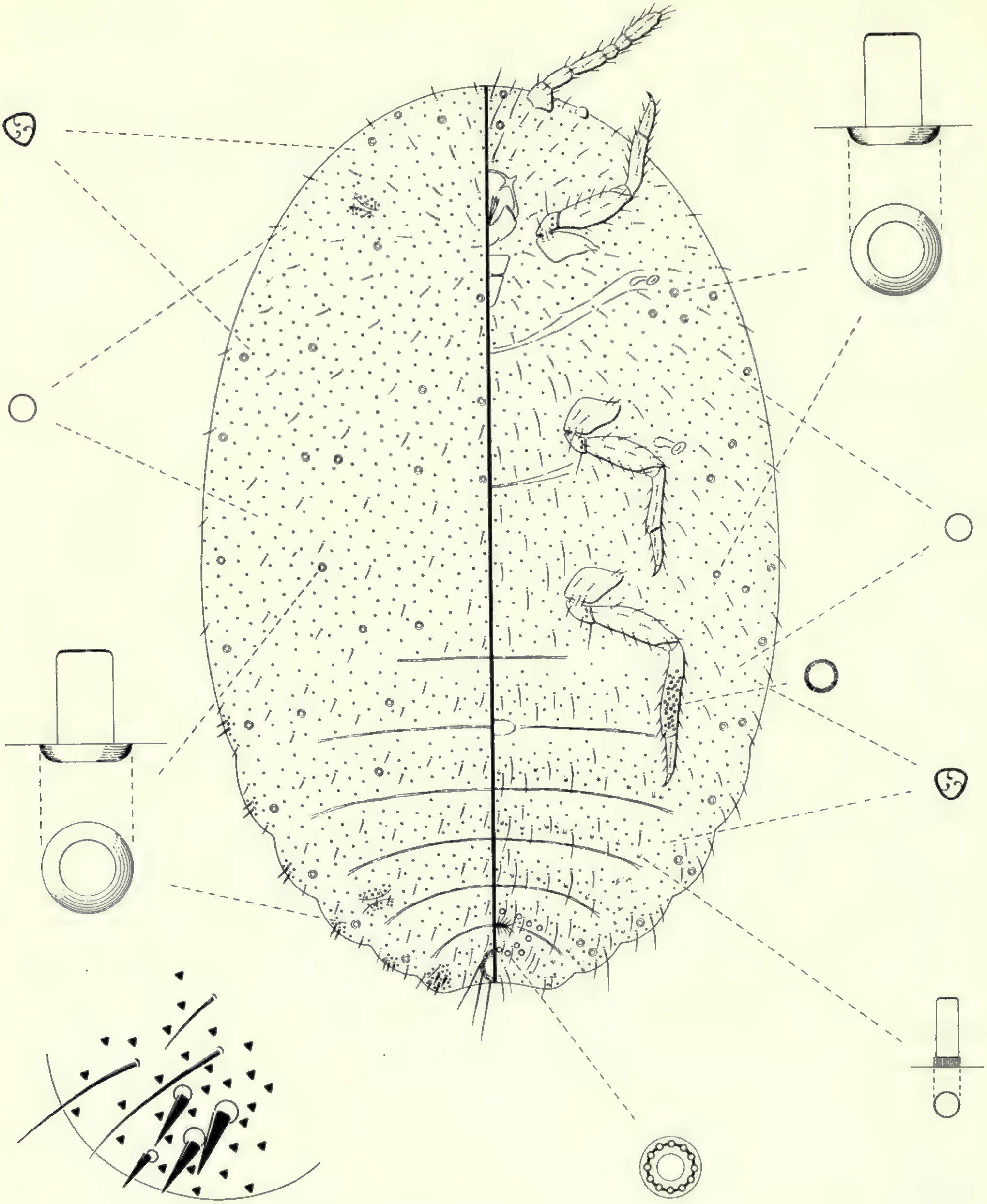

Plate 41. *Ripersia speciosa* sp. n.

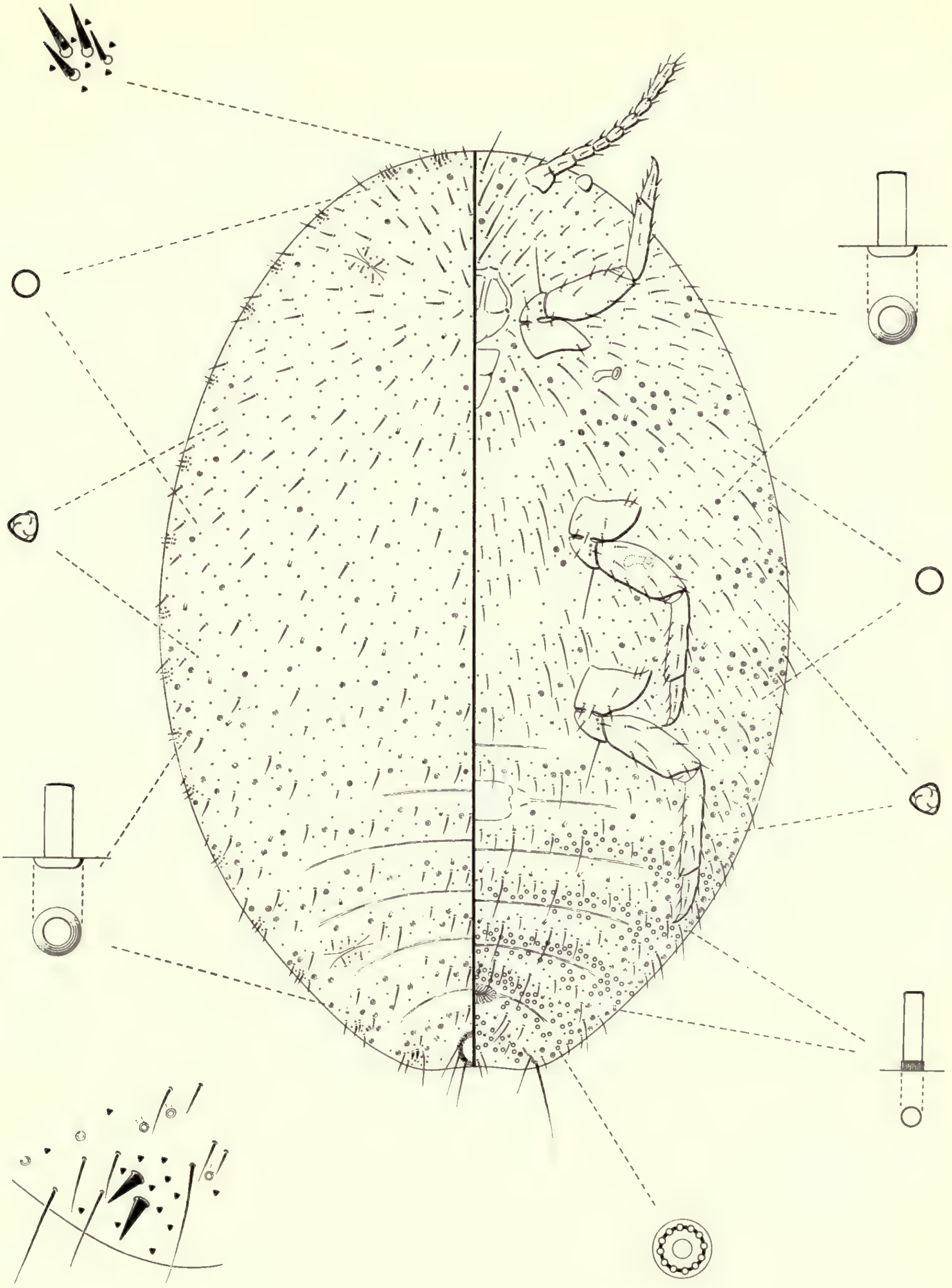

Plate 42. *Spilococcus commiphorae* sp. n.

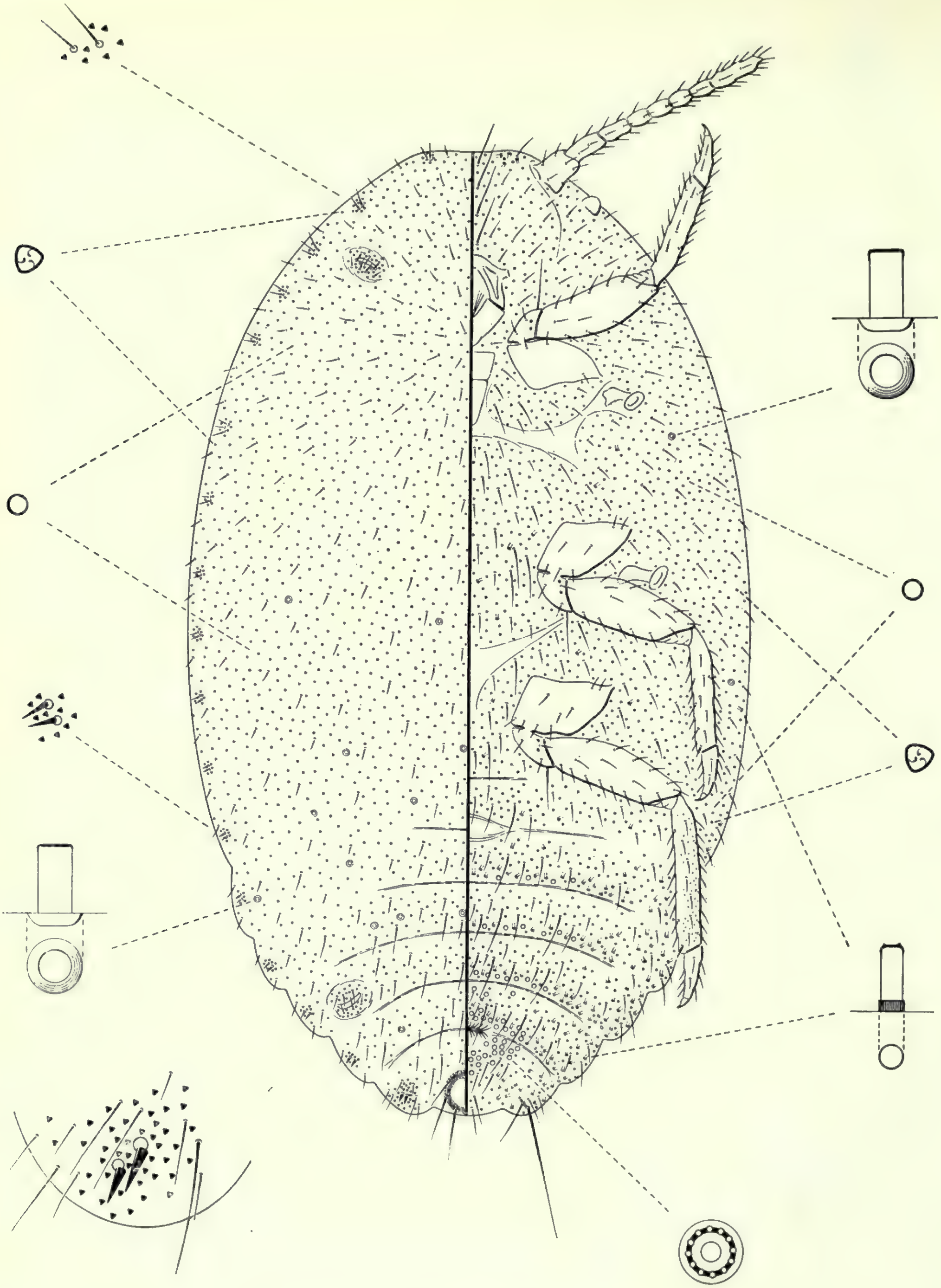

Plate 43. *Spilococcus diversus* sp. n.

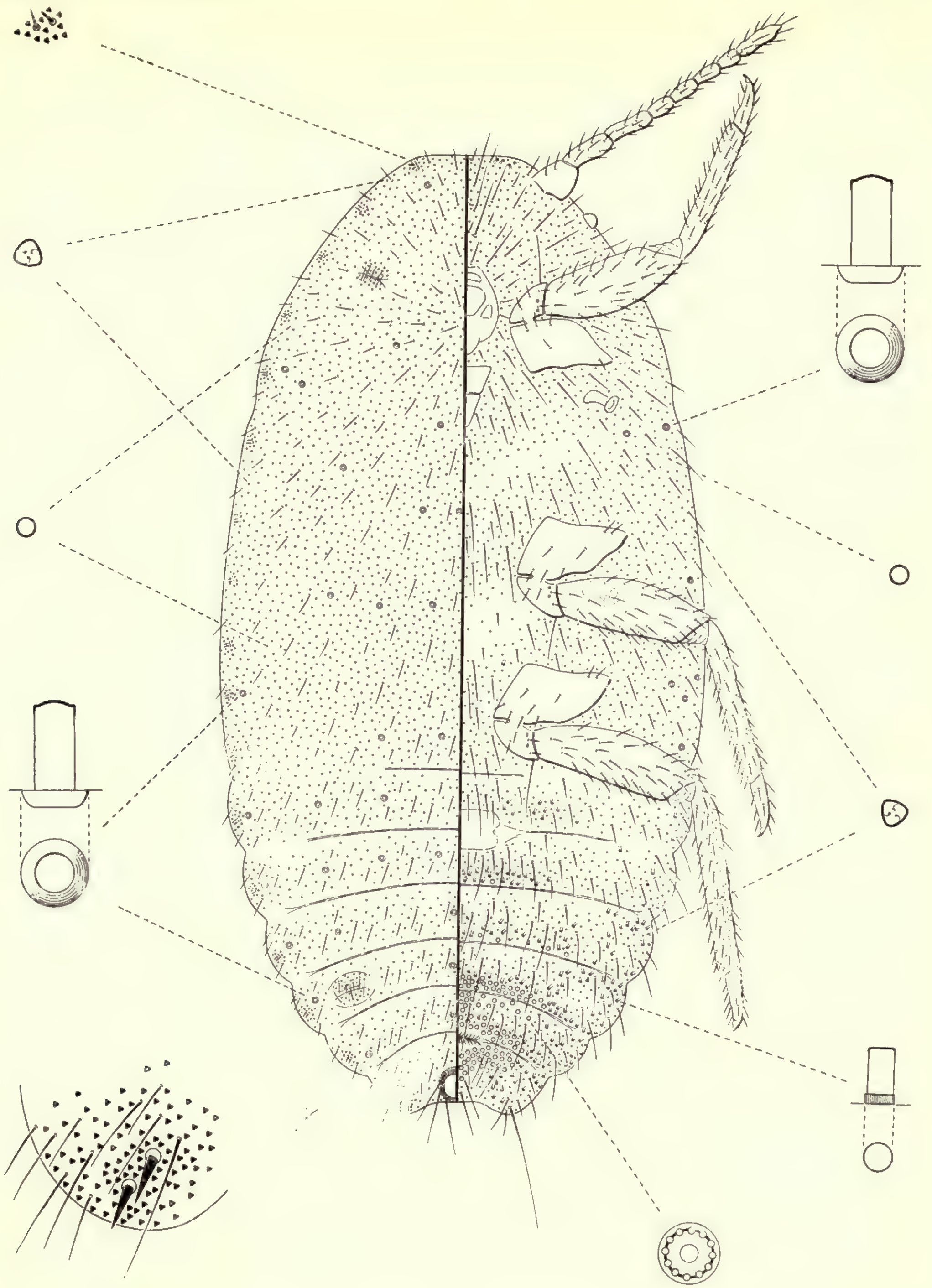

Plate 44. *Spilococcus kajiadoensis* sp. n.

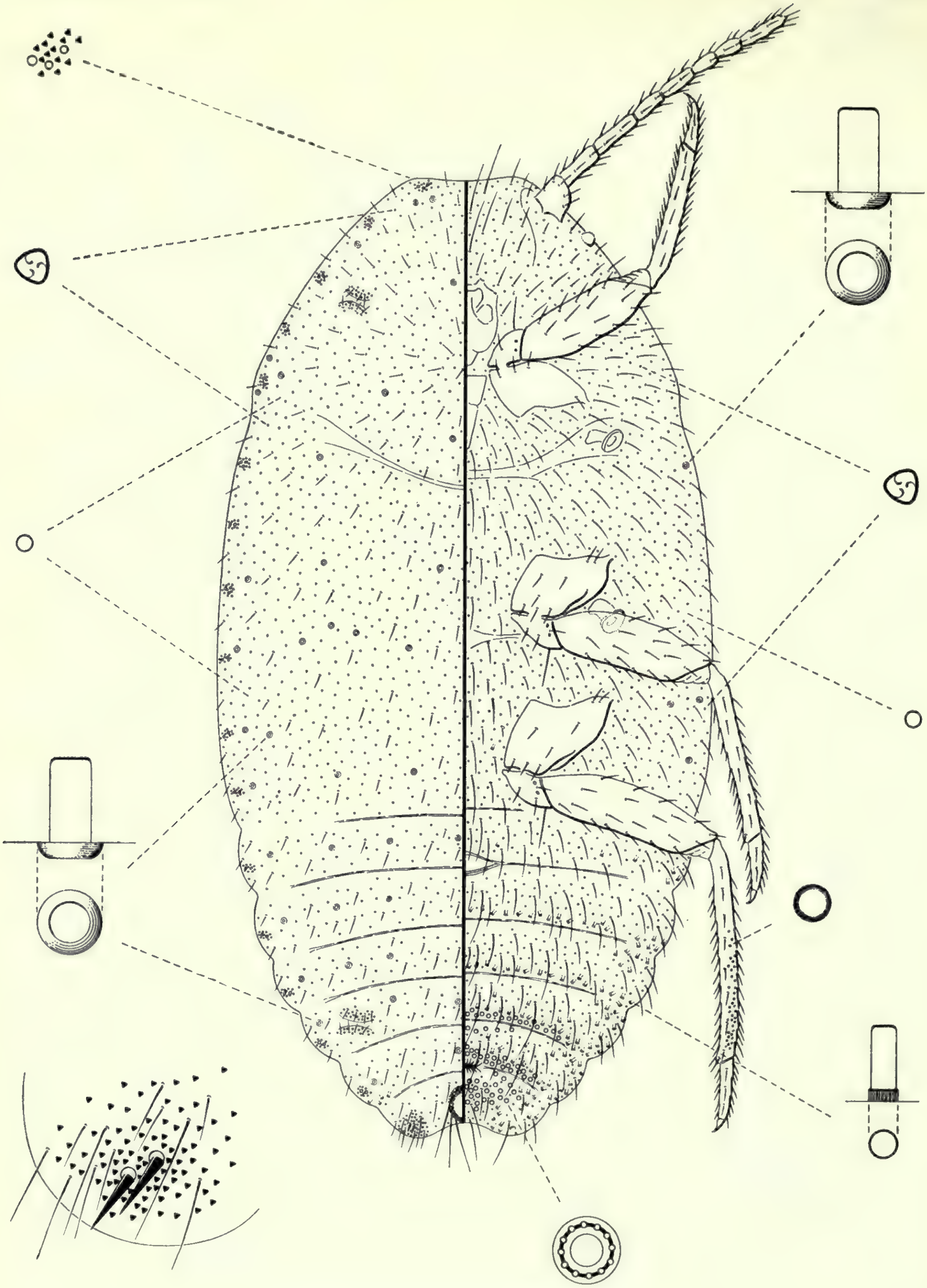

Plate 45. *Spilococcus limuricus* sp. n.

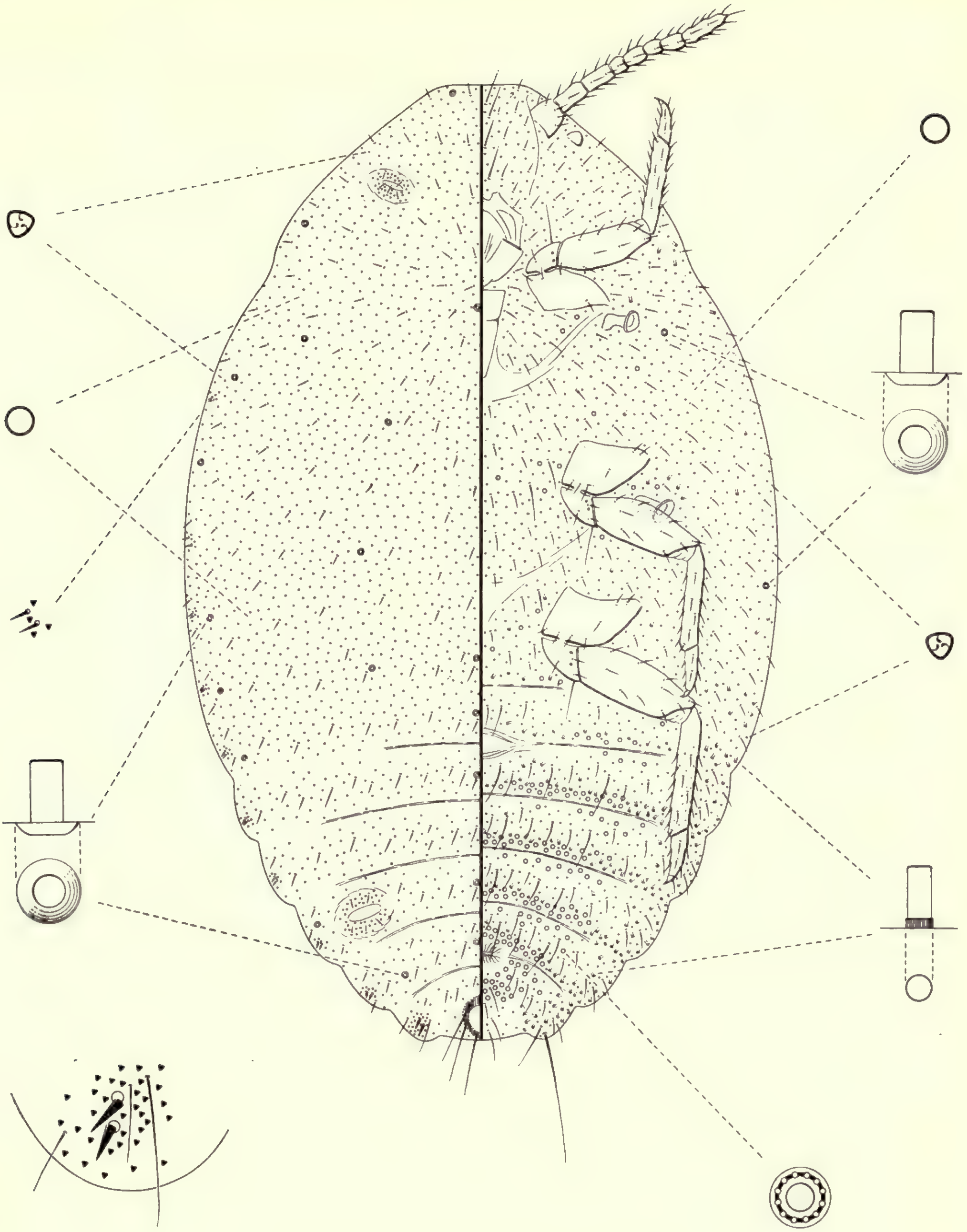

Plate 46. *Spilococcus pusillus* sp. n.

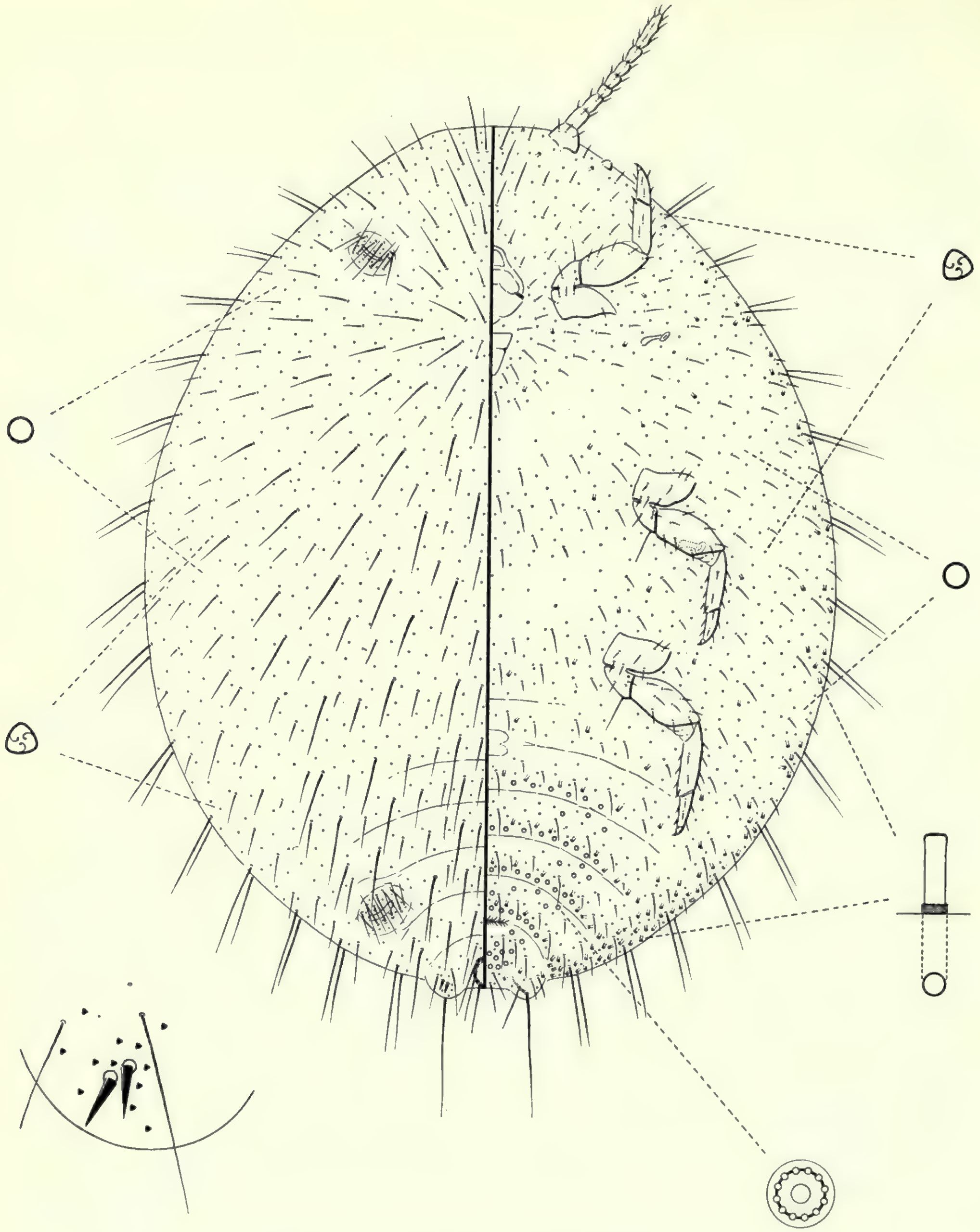

Plate 47. *Trionymus longipilosus* sp. n.

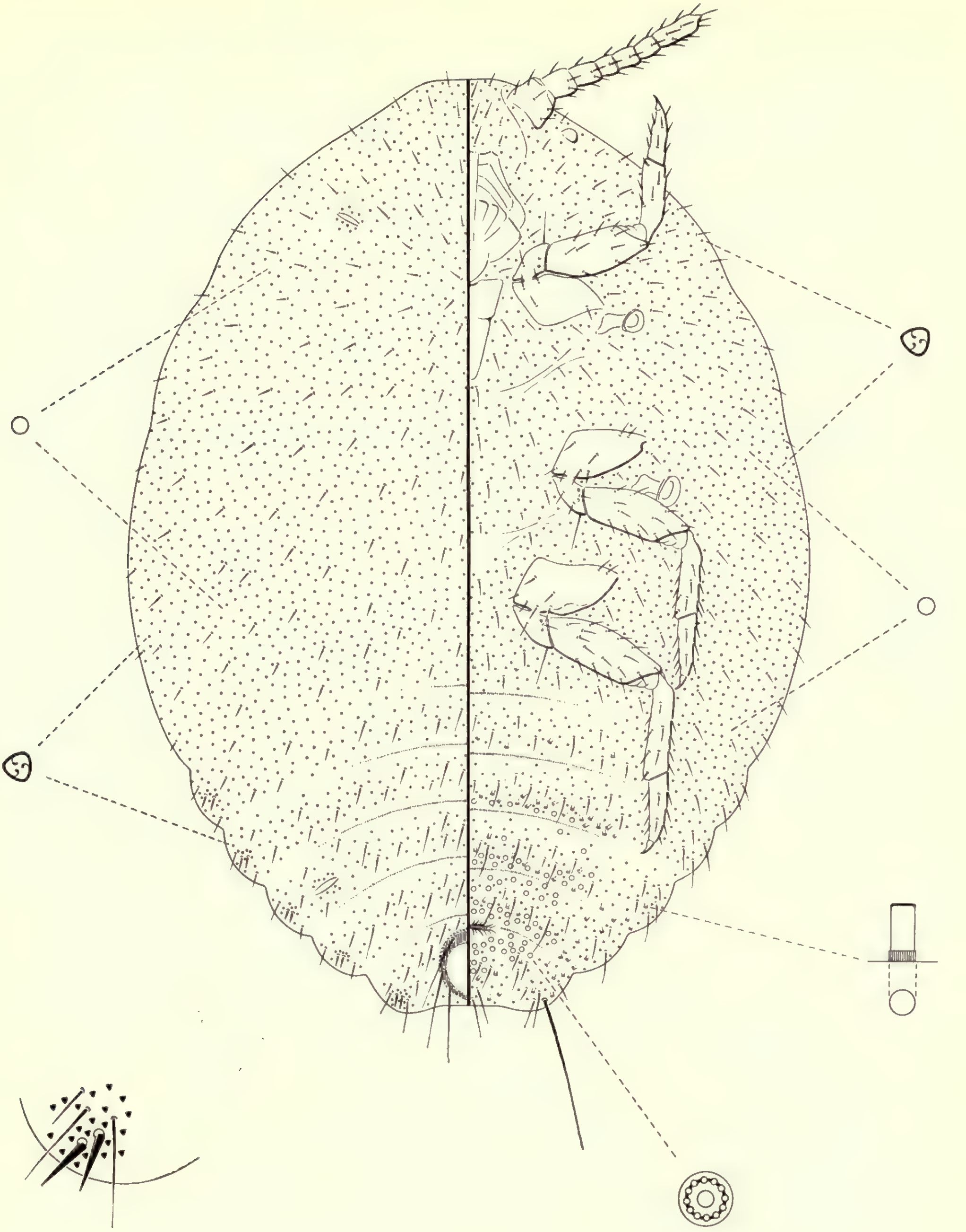

Plate 48. *Trionymus pygmaeus* sp. n.

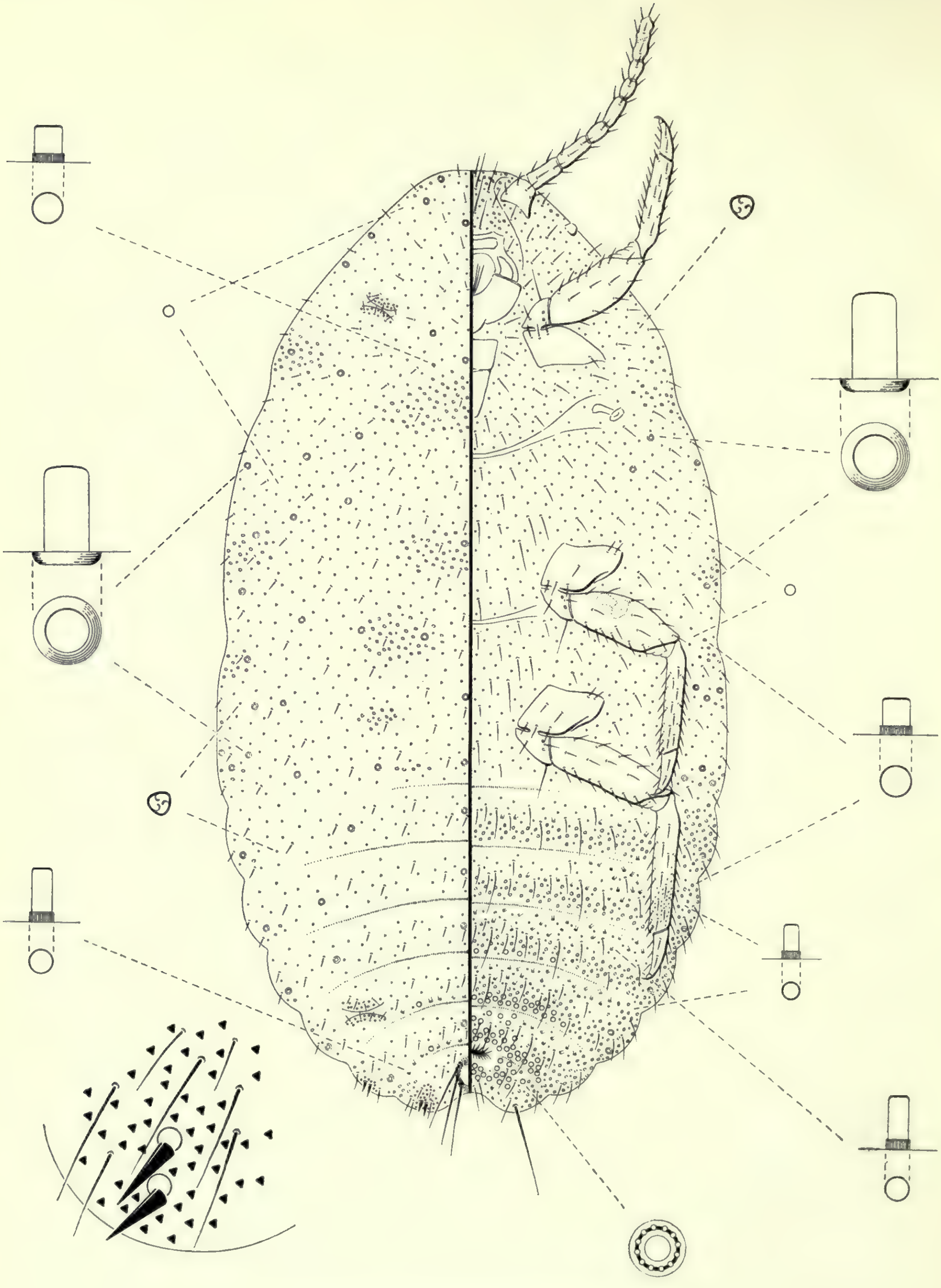

Plate 49. *Trionymus viator* sp. n.

A CATALOGUE OF THE TYPES AND OTHER SPECIMENS IN THE BRITISH MUSEUM (NATURAL HISTORY) OF THE GENUS *ZYGAENA* FABRICIUS, LEPIDOPTERA : ZYGAENIDAE

12 APR 196

W. G. TREMEWAN

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ENTOMOLOGY Vol. 10 No. 7
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NATURAL HISTORY

BY

W. G. TREMEWAN

Ref.

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A CATALOGUE
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By W. G. TREMEWAN

THE object of the following work has been to establish the types and select lectotypes where necessary of the genus *Zygaena* Fabricius. There are some types that cannot be traced; for instance, one or two of the original specimens from the Boisduval collection cannot be found although they should be preserved in the British Museum collections. Many of the Tutt types are missing; this is not surprising as apart from his collection having been sold in 1911–12 he had the habit of naming specimens in other collections or even applying a name to a figure where this depicted an actual specimen (*vide Brit. Lep.* **1** : 487, *trifolii* ab. *obscura* Tutt).

The Rothschild collections were acquired by the British Museum in 1939. The *Zygaena* collection, which was until recently housed at Tring, was built up from many sources and contained the Oberthür collection (which in itself incorporated the collections of Boisduval, de Graslin and Guenée), the Ragusa collection from Sicily, and specimens from Groum-Grschimailo, Holl and others of less importance. According to Horn & Kahle (1935–37) part of the Freyer collection was acquired by Rothschild; I can, however, find only one *Zygaena* type described by Freyer. The Frey collection was acquired by the British Museum in 1880 followed by the Zeller collection in 1884.

Each type is illustrated, together with additional specimens where necessary. The original photographs were enlarged approximately ×2 and the plates have been reduced by a half to appear natural size. The genitalia of each specimen have been examined but are only illustrated where the type is of the nominate race.

As an addendum I have included examples of paratypes and cotypes contained in the British Museum collections. This was thought advantageous as the types are scattered in various private and museum collections on the Continent.

In expressing the synonymy I have followed the system used by J. F. Gates Clarke (1955). The data on the pin labels have been included *exactly as they were written.* The data of each label are contained within inverted commas.

The reference to each description is preceded by the name of the species, subspecies or aberration as originally quoted by the author. It will be realized that, under the present classification, changes have been made and where a race was described as a species, it may now be considered a subspecies or even an aberration. There are also changes in the synonymy, much of which has already been published, Reiss & Tremewan (1960). The following terms are employed: (1) *ssp.* = subspecies or geographical race; (2) *f.t.* = *forma tempestatis* meaning a seasonal form; (3) *f. loc.* = *forma alicuius loci* which is a form confined to one particular locality within the range of a subspecies; (4) *ab.* = aberration. These terms are based on the classification of Rothschild & Jordan (1903).

About twenty subgenera have been erected within the genus *Zygaena*, but here I have only used three, viz., *Mesembrynus* Hübn., *Agrumenia* Hübn., and *Zygaena* Fabr. This follows the classification of Reiss (1958), who has grouped the species under these three subgenera. This classification is based on the genital structure, wing pattern and biology of the species. The larvae of the species in the subgenus *Mesembrynus* feed on plants of the families Umbelliferae, Compositae and Labiatae; the larvae of the species in subg. *Agrumenia* feed mostly on hard-leaved Papilionaceae, while those in subg. *Zygaena* feed on soft-leaved Papilionaceae. It is interesting to note that the species classified according to foodplants, also show affinities in wing pattern and genital structure within each subgenus. Following this classification the species *erebus* Stdgr. (*mana* Kirby), *gallica* Obthr., *nevadensis* Ramb. and *dalmatina* Boisd. (*scabiosae auct.*) are now removed from the subgenus *Silvicola* Bgff. and placed in the subgenus *Zygaena*. The subgenus *Silvicola*, which contained these four species and immediately followed the subgenus *Mesembrynus*, is now considered synonymous with subg. *Zygaena*. The structure of the genitalia of the four species show that they belong in *Zygaena*, although the fore wings normally have the streaked pattern of some species of *Mesembrynus*.

According to Reiss (1958), the species of subg. *Mesembrynus* are the most primitive. *Z. rubicundus* Hübn., with completely red fore wings, is placed at the head of the list, followed by six-spotted species such as *cambysea* Led. and *rubricollis* Hamps., etc. These are followed by the streaked species such as *favonia* Frr., *erythrus* Hübn. and *purpuralis* Brünn., etc. Next is subg. *Agrumenia*, where the species are usually six-spotted, the spots in most species are encircled with yellow, cream or white. Many species and subspecies have red or yellow abdominal rings. The red colour in the fore wing spots in *Agrumenia* began from the centre in the more primitive species. The yellowish or whitish ring then appeared as the remainder of the former colour of the fore wing spots, which are in the more primitive species of *Mesembrynus* unicoloured white, yellow, orange, light red or carmine red. *Z. cocandica* Ersch. and its subspecies *banghaasi* Bgff. are good examples. Finally, subg. *Zygaena* where the species are five- or six-spotted, the majority without the abdominal ring and all without the lighter colour surrounding the spots.

It will be realized that the species in subg. *Zygaena* are considered to be the most recent and have lost the cream or white rings around the fore wing spots. It is interesting to note that a specimen of *filipendulae* L. taken in Italy has faint cream rings around the spots of the fore wings (Reiss, *in lit.*). Apparently this form only occurs now as an extremely rare aberration and is very rarely captured. For full details of this classification see Reiss (1958).

The normal red coloration of the spots and hind wings may be replaced by orange or yellow; where this occurs in specimens with an abdominal ring, this colour replacement takes place in the ring as well. The genetics of the yellow aberrations have been worked out in very few species, but it is highly probable that, where the yellow form occurs as a rare aberration, it is a simple recessive. However, it appears to be the dominant factor in some races, such as *transalpina* Esp. ssp. *albana* Bgff. from Mte. Albano, Italy, where the whole of the race is yellow and the red form occurs only as a rare aberration.

The wing pattern of the species may be divided approximately into three groups : (1) fore wings with three longitudinal streaks ; (2) fore wings with six spots, each spot surrounded by a yellowish or cream ring ; (3) fore wings with five or six spots without the yellowish or cream rings. All types of variation occur ; aberrant specimens having the streaks reduced or interrupted and forming spots, others having the spots coalescing and forming streaks. In normally five-spotted species an extra spot (spot 6) may occur, or in six-spotted species spot 6 may be reduced or absent. This is found not only as an individual aberration but may be found in a whole or a greater percentage of a large population, constituting a subspecies.

I have had the pleasure of discussing this work with Mr. Hugo Reiss, Stuttgart, to whom I am most grateful for his helpful suggestions and the interest he has taken. I must thank him also for his painstaking care in checking the whole of this work while in manuscript.

Regarding the illustrations my thanks are due to the staff photographers of the British Museum (Natural History), in particular to Messrs. C. Horton and N. Tanti who produced the excellent photographs of the specimens, and Mr. J. Brown who is responsible for the photomicrographs of the genitalia.

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Subg. ***MESEMBRYNUS*** Hübner

Zygaena rubicundus Hübner

Sphinx rubicundus Hübner, [13th. March 1814]–[31st. December 1817], *Europ. Schmett.* **2**, pl. 30, fig. 137.

Zygaena rubicundus Hübn. ab. ***pseudofaitensis*** Stauder

Zygaena rubicundus Hübn. f. *pseudofaitensis* Stauder, 1929, *Ent. Z.* **43** : 6.

(Pl. 50, fig. 3)

Lectotype : ♂ 24 mm. " Italia mer. penins. Sorrento Mte. Falto 21.6.1928 H. Stauder 1000 m " ; " rubicundus f. pseudofaitensis Stdr. Type ".
ex Rothschild collection. Slide No. 436.

There are two additional specimens, one labelled " type ", from the same locality and with the following dates : " 3 " and " 5.7.1928. ". The specimens originated from Mte. Faito, erroneously spelt Mte. Falto on the pin label.

Zygaena rubricollis Hampson

Zygaena rubricollis Hampson, 1900, *J. Bombay. nat. Hist. Soc.* **13** : 224, pl. B, fig. 9.

(Pl. 50, fig. 8)

Type : ♀ 36 mm. " Shishi Kuh Valley. Chitral. VII & VIII. 91.9.000–14.000 ft. G. H. Colomb. 99–65. " ; " Zygaena rubricollis, Hmpsn. type ♀ ".
Slide No. *222*, Pl. 64, figs. 1, 2.

Zygaena cuvieri Boisduval

Zygaena cuvieri Boisduval, 1829, *Mon. Zyg.*, p. 53, pl. 3, fig. 6.

(Pl. 50, fig. 1)

Type : ♂ 40 mm. "Cuvieri. B. persia " ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection.

The abdomen is badly damaged, especially on the underside ; the genitalia are missing.

There is some doubt concerning the locality on the pin label. Boisduval stated that the species was taken " . . . aux environs d'Amaden, en Perse, par feu Olivier." This is probably Amadia, which is in Iraq and which should be taken as the type locality. Referring to the history of Iraq, the country was constantly at war with Persia. In the first period of the nineteenth century Iraq was still claimed by the Persians who were finally defeated in 1823. The status of Iraq was then restored but the boundary with Persia was not agreed upon until 1847 at the Treaty of Erzurum. Boisduval stated that the species was taken by the *late* Olivier, so that when the specimen was captured, Amadia was probably still considered to be in Persian territory.

Zygaena cuvieri Boisd. ab. ***confluens*** Oberthür

Zygaena cuvieri ab. *Confluens* Oberthür, 1896, *Et. d'Ent.* **20** : 46, pl. 7, fig. 112.

(Pl. 50, fig. 2)

Type : ♂ 37 mm. " Mésopotamie " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No. 112 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 489.

Zygaena corsica Boisduval

Zygaena corsica Boisduval, 1829, *Mon. Zyg.* p. 81, pl. 5, fig. 2.

(Pl. 50, fig. 4)

Lectotype : ♂ 23 mm. " Corsica BD." ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 463, Pl. 58, figs. 1, 2.

The species was described from the mountains of Corsica.

Zygaena aurata Blachier

Zygaena aurata Blachier, 1905, *Bull. Soc. ent. Fr.*, p. 213.

Zygaena aurata Blach. ssp. ***blachieri*** Rothschild

Zygaena aurata blachieri Rothschild, 1931, *Novit. zool.* **36** : 199.

(Pl. 50, fig. 5)

Type : ♂ 30 mm. " Tizi-n-Tichka, Gt. Atlas, 2450 m. 12 July 1930. (Hartert & Young)." ; " Zygaena aurata blachieri Rothsch. Type N.Z. Vol. 36.".
ex Rothschild collection. Slide No. 451.

I consider *aurata* Blach. to be a species distinct from *favonia* Frr., but Alberti (1958, *Mitt. zool. Mus. Berl.* **34** : 332) considered it a subspecies. Reiss (1930, Seitz, *Macrolep.*, Suppl., **2** : 13) treated *aurata* as a separate species, and stated that it differs from *favonia* flying in the same locality.

Zygaena loyselis Oberthür

Zygaena Loyselis Oberthür, 1876, *Et. d'Ent.* **1** : 34.

(Pl. 50, fig. 6)

Lectotype : ♂ 29 mm. " Lambessa R. Oberthür 1875 " ; " coll. Ch Oberthür.".
ex Rothschild collection. Slide No. 446, Pl. 58, figs. 3, 4.

Zyganea loyselis Obthr. ssp. ***occidentis*** Burgeff

Zygaena loyselis var. *occidentis* Burgeff, 1926, *Mitt. münchen. ent. Ges.* **16** : 25 (new name for *occidentalis* Obthr. [preoccupied]).
Zygaena Loyselis var. *occidentalis* Oberthür, 1916, *Lép. Comp.* **12** : 208.

(Pl. 50, fig. 7)

Lectotype : ♂ 28 mm. " Algérie Géryville 10–26 Mai 1886 Lt. Lahaye." ; a photograph of the specimen on the reverse side of which is written " figuré XIIIe liv'on Etud. Entom. pl. 8. fig. 76." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 447.

Zygaena loyselis Obthr. ssp. ***fracticingulata*** Rothschild

Zygaena loyselis fracticingulata Rothschild, 1925, *Ann. Mag. nat. Hist.* (9) **15** : 679.

(Pl. 50, fig. 9)

Type : ♀ 30 mm. " Grand Atlas Hte Réraya Alluaud 133 " ; " Z. loyselis fracticingulata Rothsch. Type " ; " coll. Ch. Oberthür." ; " Original zur Abbildung des Z. fracticingulata ♀ im Seitz, Suppl., Bd. 2, Tafel 1l 1930. H. Reiss.".
ex Rothschild collection. Slide No. 448.

Zygaena loyselis Obthr. ssp. ***olivacea*** Rothschild

Zygaena loyselis olivacea Rothschild, 1925, *Ann. Mag. nat. Hist.* (9) **15** : 680.

(Pl. 50, fig. 10)

Type : ♀ 31 mm. " Taza, Maroc, (P. Rotrou)." ; " Z. loyselis olivacea Rothsch. Type " ; " Original zur Abbildung des Z. olivacea ♀ im Seitz, Suppl., Bd. 2, Tafel 1l 1930. H. Reiss.".
ex Rothschild collection. Slide No. 449.

Zygaena loyselis Obthr. ssp. ***montana*** Rothschild

Zygaena ungemachi montana Rothschild, 1925, *Bull. Soc. Sci. nat. Maroc.* **5** : 140.

(Pl. 50, fig. 11)

Type : ♂ 26 mm. " Nr. Azrou, Maroc, Middle Atlas, 1300 m. 14. V. 24. (Hartert & Young)." ; " Z. ungemachii montana Rothsch. Type " ; " Original zur Abbildung des Z. montana ♂ im Seitz, Suppl., Bd. 2, Tafel 1k 1930. H. Reiss.".
ex Rothschild collection. Slide No. 450.

Zygaena favonia Freyer

Zygaena Favonia Freyer, 1845, *Neue Beitr. zur. Schmett.* **5** : 76, pl. 428, fig. 1.

Zygaena favonia Frr. ab. ***flava*** Rothschild

Zygaena favonia ab. *flava* Rothschild, 1917, *Novit. zool.* **24** : 336.

(Pl. 50, fig. 12)

Type : ♂ 25 mm. " Djebel Djeloud Tunis 31.3.12 " ; " 335 ".
ex Rothschild collection. Slide No. 454.

Zygaena favonia Frr. ssp. ***vitrina*** Stdgr. ab. ***powelli*** Oberthür

Zygaena Favonia-Powelli Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 175.

(Pl. 50, fig. 13)

Type : ♀ 26 mm. " Khenchela (Prov. Constantine) H. Powell juin 1908 " ; " Zygaena favonia 15.6. 08 Khenchela " ; " A servi de Modèle à J. Culot de

Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX 175 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 453.

Zygaena favonia Frr. ssp. **_borreyi_** Oberthür

Zygaena Favonia var. *Borreyi* Oberthür, 1922, *Lép. Comp.* **19** : 157, pl. 535, figs. 4453, 4454.

(Pl. 50, fig. 14)

Lectotype : ♀ 32 mm. " Maroc Harold Powell Chabat-el-Hamma 1er juin 1921 " ; " var Borreyi " ; " coll. Ch. Oberthur." ; a figure of the specimen numbered " 4453 ".
ex Rothschild collection. Slide No. 455.

Zygaena favonia Frr. ssp. **_cadillaci_** Oberthür

Zygaena Cadillaci Oberthür, 1921, *Lép. Comp.* **18** (1) : 62, pl. T, fig. 2.
Zygaena Cadillaci Oberthür, 1922, *Lép. Comp.* **19** : 158, pl. 535, figs. 4450, 4451, 4452.

(Pl. 50, fig. 15)

Type : ♀ 30 mm. " Maroc Forêt d'Azrou Moyen Atlas Harold Powell Juillet 1920 " ; " Zygaena cadillaci, Obthr " ; " A servi de modèle pour la photographie de la Pl. T Vol. XVIII Etudes de Lépidoptérologie comparée." ; a figure of the specimen numbered " 4450 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 456.

Zygaena favonia Frr. ssp. **_maroccensis_** Reiss

Zygaena favonia var. *maroccensis* Reiss, 1930, *in* Seitz, *Macrolep.* Suppl. **2** : 13 (new name for *intermedia* Roths. [preoccupied]).
Zygaena favonia aurata f. dimorph. *intermedia* Rothschild, 1917, *Novit. zool.* **24** : 336.

(Pl. 50, fig. 17)

Type : ♂ 23 mm. " Tizi Gourza, Atlas, Marocco, up to 12,400'.vii. (Meade-Waldo) " ; " Z. favonia intermedia Rothsch. Type " ; " Original zur Abbildung des Z. maroccensis ♂ im Seitz, Suppl., Bd. 2, Tafel 1l 1930. H. Reiss.".
ex Rothschild collection. Slide No. 458.

Zygaena favonia Frr. ssp. **_littoralis_** Rothschild

Zygaena favonia littoralis Rothschild, 1917, *Novit. zool.* **24** : 336.
Zygaena loyselis ungemachi Le Cerf, Roths. *nec* Le Cerf, ab. *cingulata* Reiss, 1943, *Z. wien. ent. Ges.* **28** : 353. **syn. nov.**

[littoralis]

(Pl. 50, fig. 16)

Type : ♂ 28 mm. " Mogador Marokko " ; " Z. favonia littoralis Rothsch. Type " ;

" Original zur Abbilding des Z. littoralis ♂ im Seitz, Suppl., Bd. 2, Tafel 1l 1930. H. Reiss.".
ex Rothschild collection. Slide No. 457.

[cingulata]

(Pl. 57, fig. 8)

Lectotype : ♀ 30 mm. " Rabat, Maroc, 20.v. 1927. (Hartert & Young).".
ex Rothschild collection. Slide No. 658.

Reiss applied the name *cingulata* to two specimens of *favonia* ssp. *littoralis* Roths. which had been incorrectly determined by Rothschild as *loyselis* ssp. *ungemachi* Le Cerf. The name *cingulata* can only be treated as a synonym of *favonia* ssp. *littoralis* Roths.

Zygaena sarpedon Hübner

Sphinx sarpedon Hübner, 1790, *Beitr. zur Geschichte der Schmett.* **2** *:* 85, pl. 1c.

Zygaena sarpedon Hübn. ssp. ***carmencita*** Oberthür

Zygaena Carmencita Oberthür, 1910, *Lép. Comp.* **4** : 457.

(Pl. 50, fig. 18)

Lectotype : ♂ 29 mm. " Pyr. Orient. Vernet-les-Bains R. Oberthür VII, VIII, 1906 " ; " carmencita Obthr. ♂ Lepid. comparée, IV " ; " sarpedon, Herrich-Schaeffer. Zyg. Europ. Tab. 7, no 51." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 459.

Zygaena sarpedon Hübn. ssp. ***carmencita*** Obthr. ab. ***flava*** Oberthür

Zygaena Sarpedon ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20** : 43, pl. 8, fig. 142.

(Pl. 50, fig. 20)

Type : ♂ 28 mm. " Vernet-l-Bains R. Oberthür Juillet 1885." ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 142 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 460.

Zygaena sarpedon Hübn. ssp. ***carmencita*** Obthr. ab. ***vernetensis*** Oberthür

Zygaena Sarpedon var. *Vernetensis* Oberthür, 1884, *Et. d'Ent.* **8** : 28.

(Pl. 50, fig. 19)

Lectotype: ♂ 26 mm. " Vernet R. Oberthür " ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 667.

The name *vernetensis* Obthr. has priority over *carmencita* Obthr., but the form can only be treated as an aberration, as although described as a " var.", Oberthür stated that it was analagous with *rhadamanthus* Esp. ab. *kiesenwetterii* H.-S.

Zygaena sarpedon Hübn. ssp. ***balearica*** Boisduval

Zygaena balearica Boisduval, 1829, *Mon. Zyg.*, p. 39, pl. 2, fig. 5.

I have been unable to find the type of *balearica* Boisd., neither can I find any specimens answering to the description. It was described from the Balearic Islands and the South of Spain.

Zygaena contaminei Boisduval

Zygaena contaminei Boisduval, 1834, *Icones*, **2** : 48, pl. 53, figs. 4, 5.

(Pl. 50, fig. 21)

Lectotype : ♂ 28 mm. " Contaminei " ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 630, Pl. 58, figs. 5, 6.

The type was described from Barèges, Hautes Pyrénées.

Zygaena contaminei Boisd. ssp. (?ab.) ***peñalabrica*** Fernández

Zygaena peñalabrica Fernândez, 1929, *Mem. Soc. esp. Hist. nat.* **15** : 599, figs. 7, 8.

(Pl. 50, fig. 22)

Type : ♂ 29 mm. " Peña Labra 30–vii–27 " ; " Typus " ; " Type " ; " 484 " ; " Zygaena contaminei Bsd. v. peñalabrica Frndz.".
ex Rothschild collection. Slide No. 462.

There are slight differences in the genitalia of *peñalabrica* and *contaminei* which I believe to be subspecific. Further material is required to ascertain the subspecific status with certainty.

Zygaena punctum Ochsenheimer

Zygaena punctum Ochsenheimer, 1808, *Schmett. Europa*, **2** : 36.

Zygaena punctum Ochs. ssp. ***faitensis*** Stauder

Zygaena punctum ssp. *faitensis* Stauder, 1929, *Ent. Z.* **43** : 30.

(Pl. 50, fig. 23)

Type : ♂ 27 mm. " Italia mer. penins. Sorrento Mte. Falto 23.6. 1928 H. Stauder Collo f. 950 m." ; " faitensis ".
ex Rothschild collection. Slide No. 437.

The specimen was described from Mte. Faito, erroneously spelt Mte. Falto on the pin label.

Zygaena punctum Ochs. ssp. ***faitensis*** Stdr. ab. ***pseudorubicundus*** Stauder

Zygaena punctum ssp. *faitensis* ab. *pseudorubicundus* Stauder, 1929, *Ent. Z.* **43** : 30.

(Pl. 50, fig. 24)

Type : ♀ 27 mm. " Italia mer. penins. Sorrento Mte. Falto 2.7. 1928 H. Stauder 950 m " ; " Type 3796 " ; " pseudorubricundus ".
ex Rothschild collection. Slide No. 438.

The specimen was described from Mte. Faito, erroneously spelt Mte. Falto on the pin label.

Zygaena zuleïma Pierret

Zygaena Zuleïma Pierret, 1837, *Ann. Soc. ent. Fr.* **6** : 22, pl. 1, fig. 8.

Zygaena zuleïma Pierr. ab. ***flavescens*** Rothschild

Zygaena zuleïma ab. *flavescens* Rothschild, 1917, *Novit. zool.* **24** : 334.

(Pl. 50, fig. 25)

Type : ♂ 22 mm. " Djebel Ressas Tunis 9,3. 1912 " ; " 328 ".
ex Rothschild collection. Slide No. 445.

The type was erroneously described as a female.

Zygaena erythrus Hübner

Sphinx erythrus Hübner, [July 1803]–[15th. November 1806], *Europ. Schmett.* **2**, pl. 18, fig. 87.

Zygaena erythrus Hübn. ssp. ***albipes*** Verity

Zygaena erythra [*sic*] var. *albipes* Verity, 1916, *Bull. Soc. ent. Fr.*, p. 289.

(Pl. 50, fig. 26)

Lectotype : ♂ 36 mm. " Sicilia Monotella 10/6 Fuge " ; " Sicily, coll. E. Ragusa." ; " Z. erythrus razza albipes Vrty " ; " erythrus minos Bd ".
ex Rothschild collection. Slide No. 490.

Zygaena erythrus Hübn. ssp. ***albipes*** Vrty. ab. ***erythraeformis*** Verity

Zygaena rubicunda [*sic*] var. *erythraeformis* Verity, 1916, *Bull. Soc. ent. Fr.*, p. 289.

(Pl. 50, fig. 27)

Lectotype : ♂ 27 mm. " Sicily, coll. E. Ragusa." ; " Erythrus Hb." ; " 56 " ; " Z. rubicundus razza erythraeformis Vrty spec. typicum ♂ " ; "erythrus minos Bd (esengl. nano) ".
ex Rothschild collection. Slide No. 491.

Until now the name *erythraeformis* has been used to describe an aberration of *rubicundus* Hübn. An examination of the type material showed that these specimens are small aberrant examples of *erythrus* Hübn.

Zygaena diaphana Staudinger

Zygaena pilosellae var. *diaphana* Staudinger, 1887, *Berl. ent. Z.* **31** : 31.

Zygaena diaphana Stdgr. ssp. ***sareptensis*** Rebel ab. ***citrina*** Oberthür

Zygaena eythrus ab. *citrina* Oberthür, 1910, *Lép. Comp.* **4** : 424.

(Pl. 50, fig. 28)

Type : ♀ 37 mm. " ab. citrina Ch. Obthr.." , " Ex. Musaeo A KUWERT 1894 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 432.

An examination of the genitalia of the type showed that the specimen is conspecific with *diaphana* Stdgr. Although the specimen is without data I place it under ssp. *sareptensis* Rebel because of its size.

Zygaena purpuralis Brünnich

Sphinx purpuralis Brünnich, 1763, Pontoppidan's *Danske Atlas*, **1** : 686, pl. 30.

Zygaena purpuralis Brünn. ab. ***separata*** Tutt

Anthrocera purpuralis ab. *separata* Tutt, 1899, *Brit. Lep.* **1** : 434.

The type is not in the British Museum. It is not certain to which subspecies Tutt applied the name *separata* and I place it under the nominate race.

Zygaena purpuralis Brünn. ssp. ***segontii*** Tremewan

Zygaena purpuralis ssp. *segontii* Tremewan, 1958, *Ent. Gaz.* **9** (4) : 188.

(Pl. 50, fig. 29)

Holotype : ♂ 28 mm. " Abersoch June 1902 C. F. Johnson." ; " Zygaena purpuralis ssp. segontii ♂ Holotype sel. W. G. Tremewan, 1958." ; " ex coll. Tutt.".
ex Rothschild collection. Slide No. 439.

Zygaena purpuralis Brünn. ssp. ***segontii*** Trmn. ab. ***obscura*** Tutt

Anthrocera purpuralis ab. *obscura* Tutt, 1899, *Brit. Lep.* **1** : 434.

(Pl. 50, fig. 30)

Tutt applied the name to three specimens which were taken in Caernarvonshire by Blagg in 1891 (Weir, *Proc. ent. Soc. Lond.*, p. xxxi). The specimen that I figure here is not the type. It has the following data : " Abersoch, N. Wales, June (beg.), 1908. F. C. Woodforde.".
ex Bankes collection. Slide No. 565.

Zygaena purpuralis Brünn. ssp. ***hibernica*** Reiss ab. ***lutescens*** Tutt

Anthrocera purpuralis ab. *lutescens* Tutt, 1899, *Brit. Lep.* **1** : 434.

Tutt applied the name *lutescens* to a specimen in the Allen collection which was later sold at Steven's. The specimen, which I have been unable to trace, was taken at Galway according to Tutt (*vide Ent. Rec.* **5** : 217).

Zygaena purpuralis Brünn. ssp. **hibernica** Reiss f. loc. **sabulosa** Tremewan

Zygaena purpuralis ssp. *hibernica* Reiss f. loc. *sabulosa* Tremewan, 1960, *Ent. Gaz.* **11** (4) : 186.

(Pl. 50, fig. 31)

Holotype : ♂ 30 mm. " Ballyvaughan co. Clare Ireland. vi. 1913." ; " Z. purpuralis ssp. hibernica Reiss f. loc. sabulosa Tremewan. Holotype ♂ det. W. G. Tremewan, 1959.".
ex Rothschild collection. Slide No. 587.

Zygaena purpuralis Brünn. ssp. **heringi** Zeller

Zygaena Heringi Zeller, 1844, *Stettin. ent. Ztg.* **5** : 42.

(Pl. 50, fig. 32)

Lectotype : ♂ 29 mm. " Stettin Hering 10.41 " ; " Zyg. Heringi Z. n.sp? ent. Ztg.".
ex Zeller collection. Slide No. 92.

The original designation of the lectotype was published in 1958, *Ent. Gaz.* **9** (4) : 184.

Zygaena purpuralis Brünn. ssp. **lathyri** Boisduval

Zygaena lathyri Boisduval, 1829, *Mon. Zyg.*, p. 32, pl. 2, fig. 1.

I consider *lathyri* Boisd. to be the subspecies of *purpuralis* Brünn. from Ragusa (Dalmatia). I have been unable to find the type.

Zygaena purpuralis Brünn. ssp. **hellena** Burgeff

Zygaena purpuralis var. *hellena* Burgeff, 1926, *Mitt. münchen. ent. Ges.* **16** : 14 (new name for *graeca* Tutt [preoccupied]).
Zygaena purpuralis var. *graeca* Tutt, 1895, *Ent. Rec.* **6** : 273.

(Pl. 51, fig. 1)

Lectotype : ♂ 33 mm. " Minos v. graeca Parnass Stdg lit. 5/2 69.".
ex Zeller collection. Slide No. 433.

Zygaena purpuralis Brünn. ssp. **pseudodiaphana** Tremewan

Zygaena purpuralis ssp. *pseudodiaphana* Tremewan, 1958, *Ent. Gaz.* **9** (4) : 184.

(Pl. 51, fig. 2)

Holotype : ♀ 31 mm. " Karacabey Brussa, As. min. 930 V/2 Ajtai " ; " Zygaena purpuralis ssp. pseudodiaphana Holotype ♀ sel. W. G. Tremewan, 1958.".
ex Rothschild collection. Slide No. 153.

Subg. ***AGRUMENIA*** Hübner

Zygaena cocandica Erschoff

Zygaena cocandica Erschoff, 1874, *in* Fedtshenko, *Lep. Turkestan*, p. 28, pl. 2, fig. 22.

Zygaena cocandica Ersch. ssp. ***pamira*** Sheljuzhko

Zygaena cocandica pamira Sheljuzhko, 1919, *N. Beitr. syst. Insektenk.* **1** : 130.
Zygaena avinoffi Hampson, 1919, *Trans. ent. Soc. Lond.*, p. 433.

[avinoffi]

(Pl. 51, fig. 3)

Type : ♂ 26 mm. " W. Turkestan Pamir. Koitesek 4000 m. 19. VI. 1909." ; " A. Avinoff. 1913–191 " ; " Zygaena avinoffi Hmpsn. type ♂.".
Slide No. 501.

Zygaena afghana Moore

Zygaena afghana Moore, 1858/9, *Cat. Lep. Ind. Mus.* **2** : 286, pl. 7a, fig. 1.

(Pl. 51, fig. 4)

Type : ♀ 28 mm. " Griffith " ; " Ind. Mus. 79,64." ; " Zygaena afghana Moore Type ".
Slide No. 271, Pl. 64, figs. 5, 6.

Described from Afghanistan. Hampson (1892, *Fauna Brit. India*, **1** : 231) gives Quetta as a further locality.

Zygaena rothschildi Reiss

Zygaena rothschildi Reiss, 1930, *in* Seitz, *Macrolep.*, Suppl., **2** : 22.

(Pl. 51, fig. 5)

Type : ♂ 26 mm. " R. Yagnob " ; " Mtes Hissar." ; " Ulaxs Capa 24. vii. 92 " ; " Coll. Groum-Grschimailo." ; " Original zur Abbildung des Z. rothschildi ♂ im Seitz, Suppl., Bd. 2, Tafel 2i 1930. H. Reiss." ; a label in Rothschild's hand : " Z. haematina Koll.".
ex Rothschild collection. Slide No. 415, Pl. 59, figs. 1, 2.

Zygaena rothschildi Reiss ab. ***latecincta*** Reiss & Tremewan

Zygaena rothschildi ab. *latecincta* Reiss & Tremewan, 1960, *Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **9** (10) : 462, pl. 22, fig. 10.

(Pl. 51, fig. 6)

Holotype : ♂ 27 mm. " Ulaxs capa 24. vii. 92 " ; " Mtes Hissar : " ; " R. Yagnob." ; " Coll. Groum-Grschimailo." ; " H. Type ♂ rothschildi ab. latecincta Reiss et Trem. 1959 H. Reiss.".
ex Rothschild collection. Slide No. 371.

Zygaena olivieri Boisduval

Zygaena olivieri Boisduval, 1829, *Mon. Zyg.*, p. 98, pl. 6, fig. 4.

(Pl. 51, fig. 7)

Lectotype : ♀ 27 mm. " olivieri. B. Cauc." ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 500, Pl. 64, figs. 3, 4.

The specimen is labelled " Cauc." but I believe this to be false as Boisduval described the species from Syria. The lectotype does not agree with the race from the Caucasus, but agrees with the subspecies from Beyrut, Syria, which is considered to be the nominate race.

Zygaena optima Reiss

Zygaena optima Reiss, 1939, *Ent. Z.* **53** : 118 (new name for *nobilis* Reiss [preoccupied]).
Zygaena nobilis Reiss, 1933, *Ent. Rdsch.* **50** : 144, figs.

Zygaena optima Reiss ab. ***tricolor*** Reiss

Zygaena nobilis ab. *tricolor* Reiss, 1935, *Int. ent. Z.* **28** : 542.

(Pl. 51, fig. 8)

Type : ♀ 29 mm. " Cauc. c. or. Daghestan Petrovsk 3000 m. Juni " ; " Type ♀ nobilis Reiss ab. tricolor Reiss 1934 H. Reiss.".

ex Rothschild collection. Slide No. 504.

According to Holik & Sheljuzhko, (1956, *Mitt. münchen ent. Ges.* **46** : 106) the specimen originates from Berg Tarki, which is approximately 1000 m. in height, not 3000 m. as stated on the pin label.

Zygaena fraxini Ménétries

Zygaena fraxini Ménétries, 1832, *Cat. Rais.*, p. 260.

Zygaena fraxini Mén. ssp. ***oribasus*** Herrich-Schäffer

Zygaena Oribasus Herrich-Schäffer, 1844, *Schmett. Europa*, **2**, pl. 4, figs. 31–34.
Zygaena rognada Boisduval, 1848, *Bull. Soc. ent. Fr.* (2) **6** : xxx.

[rognada]

(Pl. 51, fig. 9)

Type : ♀ 31 mm. " Rognada. K. Russ. m." ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 503.

Described from Odessa.

Zygaena felix Oberthür

Zygaena Faustina ? Ochs. (*Felix* Obr. in Mus) Oberthür, 1876, *Et. d'Ent.* **1** : 36.

(Pl. 51, fig. 10)

Neotype : ♂ 25 mm. " Sebdou 274 18–5–81 " ; " Sebdou (Oran) Dr Codet 1880–1882 " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 506, Pl. 59, figs. 3, 4.

In 1887, Staudinger (*Berl. ent. Z.* **31** : 38) relegated the type race to the neighbourhood of Sebdou, because Oberthür had described the unbelted, as well as the belted form. We should therefore take the population from Sebdou as the nominate race. In 1888, Oberthür mentioned Magenta, Sebdou and Lambessa as the locality for *felix*.

As no syntype material can be found in the Oberthür collection I designate the specimen with the data quoted above as a neotype.

Zygaena excelsa Rothschild

Zygaena marcouna [*sic*] *excelsa* Rothschild, 1917, *Novit. zool.* **24** : 340.

(Pl. 51, fig. 11)

Type : ♂ 29 mm. " Djebel Mekter, 1600–1800 m., nr. Aïn Sefra, 10. May 1913 (W. R. & E. H.) " ; " Zygaena marcouna excelsa Rothsch. Type ".

ex Rothschild collection. Slide No. 516, Pl. 59, figs. 5, 6.

Zygaena marcuna Oberthür

Zygaena Marcuna Stdgr. (in litteris) Oberthür, 1888, *Et. d'Ent.* **12** : 27.
Zygaena marcouna auctorum.

(Pl. 51, fig. 12)

Lectotype : ♂ 28 mm. " Marcuna Stgr. Lambèze Staud. 1887 Marcouna, mi mai " ; " 4/5 " ; " Etud. d'Entom. XIIIe liv'on pl. 7. fig. 58.", on the reverse side of the latter label is a photograph of the specimen ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 517, Pl. 60, figs. 1, 2.

The original designation of the lectotype was published in 1960, *vide Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **9** (10) : 463.

Zygaena alluaudi Oberthür

Zygaena Alluaudi Oberthür, 1922, *Lép. Comp.* **19** : 159, pl. 545, figs. 4583, 4584.

(Pl. 51, fig. 13)

Lectotype : ♂ 27 mm. " Bou Angher 2000 m Alluaud 82 " ; " Zygaena alluaudi n.sp." ; " coll. Ch. Oberthür.". Also a figure of the specimen numbered " 4584 ".

ex Rothschild collection. Slide No. 515, Pl. 60, figs. 3, 4.

The original designation of the lectotype was published in 1960, *vide Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **9** (10) : 463.

Zygaena hilaris Ochsenheimer

Zygaena hilaris Ochsenheimer, 1808, *Schmett. Europa*, **2** : 101.

Zygaena hilaris Ochs. ssp. ***galliae*** Oberthür

Zygaena hilaris-Galliae Oberthür, 1910, *Lép. Comp.* **4** : 602 (with reference to *Et. d'Ent.* **12**, pl. 7, figs. 48a, b, c).

(Pl. 51, fig. 14)

Lectotype : ♂ 27 mm. " Pyrénées Orientales Env. de Vernet-l-B. René Oberthür Eté 1886." ; " à servi de modèle à D'Apreval 1887 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 499.

Zygaena hilaris Ochs. ssp. ***galliae*** Obthr. ab. ***bicolor*** Oberthür

Zygaena hilaris ab. *bicolor* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 7, fig. 130.

(Pl. 51, fig. 15)

Type : ♀ 30 mm. " Pyrénées Orientales Vernet-les-Bains R. Oberthür Eté 1889 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No 130 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 497.

Zygaena hilaris Ochs. ssp. ***galliae*** Obthr. ab. ***unicolor*** Oberthür

Zygaena hilaris ab. *unicolor* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 7, fig. 131.

(Pl. 51, fig. 16)

Type : ♀ 29 mm. " Pyrénées Orientales Vernet-les-Bains R. Oberthür Eté 1889 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No. 131 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 498.

Zygaena hilaris Ochs. ssp. ***galliae*** Obthr. ab. ***confluens*** Oberthür

Zygaena hilaris ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 7, fig. 129.

(Pl. 51, fig. 17)

Type : ♀ 27 mm. " Pyrénées Orientales Env. de Vernet l. B. Eté 1887 Ch. & R. Oberthür." ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No. 129 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 496.

Zygaena hilaris Ochs. ssp. ***ononidis*** Mill. ab. ***tricolor*** Oberthür

Zygaena hilaris-tricolor Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 180.

(Pl. 51, fig. 18)

Type : ♀ 27 mm. " Moulinet vii–06 hilaris ab." ; " –tricolor type " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 180 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 492.

Zygaena hilaris Ochs. ssp. ***ononidis*** Mill. ab. ***foulquieri*** Oberthür

Zygaena hilaris-Foulquieri Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 179.

(Pl. 51, fig. 19)

Type : ♂ 26 mm. " Saint-Pons près Gémenos (B. du. Rh) 12 Juillet 1903 Foulquier " ; " Foulquieri type " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 179 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 494.

Zygaena hilaris Ochs. ssp. ***ononidis*** Mill. ab. ***aurantiaca*** Oberthür

Zygaena hilaris ab. *aurantiaca* Oberthür, 1910, *Lép. Comp.* **4** : 603.

(Pl. 51, fig. 20)

Type : ♂ 27 mm. " Moulinet VII–06 Hilaris ab. flava " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 495.

This specimen was labelled " ab. flava " by the collector.

Zygaena hilaris Ochs. ssp. ***escorialensis*** Oberthür

Zygaena hilaris var. *Escorialensis* Oberthür, 1884, *Et. d'Ent.* **8** : 33.

(Pl. 51, fig. 21)

Lectotype : ♀ 25 mm. " Escorial (Espagne) L. Bleuse 29, 30/7 1879 " ; " var. Escorialensis Obtr." ; " Vu par Staudinger Catalogue 1900 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 493.

Zygaena algira Duponchel

Zygaena algira Duponchel, 1835, *Hist. des Lép.*, Suppl. **2** : 86, pl. 7, fig. 6.
Zygaena Bachagha Oberthür, 1916, *Lép. Comp.*, **12** : 226.

(Pl. 51, fig. 22)

Duponchel's description does not agree with his figure, and Oberthür took the figure as valid and not the description. Oberthür then gave the name *bachagha* to the insect figured by Herrich-Schäffer under the name of *algira*, which is also the insect described by Duponchel. However, Duponchel's description is valid, and the name *bachagha* is a synonym. This has already been accepted by Rothschild (1917, *Novit. zool.* **24** : 338) and Reiss (1930, Seitz, *Macrolep.*, Suppl. **2** : 25).

The specimen I figure here is a male, and one that Oberthür illustrated. It has the following data : " Alger " ; " coll. Ch. Oberthür." ; and a photograph of the specimen, on the reverse side of which is written " Etud. d'Entom. XIIIe liv'on pl. 7. fig. 59 ".
ex Rothschild collection. Slide No. 514, Pl. 60, figs. 5, 6.

Zygaena algira Dup. ab. ***concolor*** Oberthür

Zygaena Algira ab. *Concolor* Oberthür, 1881, *Et. d'Ent.* **6** : 68, pl. 2, fig. 4.

The name *concolor* was applied by Oberthür to an aberration of *algira* in the collection of G. Allard, which is now in the Pasteur Institut, Paris. There are no examples of this aberration in the British Museum collection which I could figure here.

Zygaena algira Dup. ab. ***bicolor*** Holl

Zygaena algira ab. *bicolor* Holl, 1912, *Bull. Soc. Hist. nat. Afr. N.* **4** (6) : 119.

(Pl. 51, fig. 23)

Type : ♀ 27 mm. " Bainen Alger 19.7. 04 " ; " Type décrit Bul. S.H.N. de l'Afr. du Nord No. 6 du 15.6. 12 page 119." ; " Collection Capt. HOLL.".
ex Rothschild collection. Slide No. 512.

Zygaena algira Dup. ab. ***aurantiaca*** Holl

Zygaena algira ab. *aurantiaca* Holl, 1912, *Bull. Soc. Hist. nat. Afr. N.* **4** (6) : 119.

(Pl. 51, fig. 24)

Type : ♀ 27 mm. " Bainen Alger. 10.6. 04 " ; " Type décrit Bull. S.H.N. de l'Afr. du Nord No. 6 du 15.6. 12 page 119 " ; " Collection Capt. HOLL.".
ex Rothschild collection. Slide No. 513.

Zygaena fausta Linnaeus

Sphinx fausta Linnaeus, 1767, *Syst. Nat., ed.* XII, p. 807.

Zygaena fausta L. ssp. ***apocrypha*** Le Charles ab. ***tricolor*** Oberthür

Zygaena fausta ab. *tricolor* Oberthür, 1904, *Lép. Comp.* **1** : 52, pl. 3, figs. 28, 29.

(Pl. 51, fig. 25)

Lectotype : ♂ 26 mm. " Basses-Alpes Digne A. Coulet 1900 " ; " Zygaena fausta-tricolor Ch. Obthr. Lépid. comparée, Pl. III No. 28." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 510.

Zygaena fausta L. ssp. ***agilis*** Reiss ab. ***brunnea*** Oberthür

Zygaena fausta-brunnea Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 178.

(Pl. 51, fig. 26)

Type : ♂ 23 mm. " fausta thuringen." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 178 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 511.

" thuringen " on the pin label probably refers to Thüringen in Germany.

Zygaena fausta L. ssp. ***junceae*** Oberthür

Zygaena fausta var. *Junceae* (Millière) Oberthür, 1884, *Et. d'Ent.* **8** : 32.

(Pl. 51, fig. 27)

Lectotype : ♂ 25 mm. " Vernet-l-Bains Pyrénées Orientales Ch. Oberthür Août 1880 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 509.

Apparently *junceae* Mill. was a manuscript name until published by Oberthür, who, in addition to quoting Vernet-les-Bains, gave Hyères as another locality. One of the two specimens from the Guenée collection mentioned by Oberthür, and now in the British Museum, is labelled Hyères, but I have not selected this specimen as the lectotype as the population from Southern France is considered to be the nominate race. I designate as lectotype a specimen from Vernet-les-Bains ; if I had selected the Guenée specimen, *junceae* Obthr. would have become a synonym of *fausta* L. and the Pyrenean race would be without a name.

Zygaena fausta L. ssp. ***fortunata*** Ramb. ab ***dupuyi*** Oberthür

Zygaena fausta-Dupuyi Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 45.

(Pl. 51, fig. 28)

Type : ♀ 26 mm. " Charente Angoulême R. Oberthür 4–5. VI. 1906." ; " Zygaena fausta-Dupuyi Obthr. type " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 109 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 508.

Zygaena fausta L. ssp. ***fortunata*** Ramb. ab. ***melusina*** Oberthür

Zygaena fausta-melusina Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 108.

(Pl. 51, fig. 29)

Type : ♀ 24 mm. " Charente Angoulême R. Oberthür 4–5. VI. 1906." ; " Zygaena fausta-melusina Obthr. type " ; " A servi de Modèle à J. Culot de Genève, pour

la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 108 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 507.

Zygaena orana Duponchel

Zygaena orana Duponchel, 1835, *Hist. des Lép.*, Suppl. **2** : 145, pl. 12, fig. 8.

Zygaena orana Dup. ab. ***oberthüri*** Bethune-Baker

Zygaena Oberthüri Bethune-Baker, 1888, *Trans. ent. Soc. Lond.*, p. 118.

(Pl. 51, fig. 30)

Type : ♀ 23 mm. " Sebdou Algeria Pech 1886 " ; " Oberthuri " ; " Type " ; " 50 " ; " G. T. B.-Baker Coll. Brit. Mus. 1927–360.".
ex Bethune-Baker collection. Slide No. 505.

Although described as a species, an examination of the genitalia showed the specimen to be conspecific with *orana* Dup.

Zygaena orana Dup. ab. ***barbara*** Herrich-Schäffer

Zygaena Barbara Herrich-Schäffer, 1844, *Schmett. Europa*, **2**, pl. 4, figs. 29, 30.
Zygaena Barbara Herrich–Schäffer, 1846, *Schmett. Europa*, **2** : 47.
Zygaena Nedroma (Austaut) Oberthür, 1881, *Et. d'Ent.* **6** : 68, pl. 3, fig. 3.

[nedroma]

(Pl. 51, fig. 31)

Type : ♀ 25 mm. " Zygaena . . . Nedroma Prov. d'Oran (Austaut) " ; " Typicum Specimen ", the latter label is printed in red type. " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 532.

Zygaena orana Dup. ssp. ***limitans*** Rothschild

Zygaena carniolica limitans Rothschild, 1917, *Novit. zool.* **24** : 341.

(Pl. 51, fig. 32)

Type : ♂ 22 mm. " Bône Constantine 9 Mai 1911 " ; " Z. orana limitans Rothsch. Type ".
ex Rothschild collection. Slide No. 531.

Zygaena orana Dup. ssp. ***lahayei*** Oberthür

Zygaena orana-Lahayei Oberthür, 1890, *Et. d'Ent.* **13** : 24, pl. 7, fig. 53.

(Pl. 51, fig. 33)

Type : ♂ 24 mm. " Algérie Géryville 10–26 Mai 1886 Lt. Lahaye." ; " Etud.

d'Entom. XIIIe liv'on pl 7. no 53", on the reverse side of the latter label is a figure of the specimen; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 519.

Zygaena orana Dup. ssp. ***lahayei*** Obthr. ab. ***powelli*** Oberthür

Zygaena orana ab. *Powelli* Oberthür, 1911, *Lép. Comp.* **5** (1) : 320, pl. 63, fig. 592.

(Pl. 51, fig. 34)

Type: ♂ 23 mm. "Algérie Région de Géryville Mai 1910 Harold Powell"; "Zygaena orana Lépid. comparée Vol. V. pl. LXIII fig. 592 Ab. Powelli. Obthr."; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 529.

Zygaena orana Dup. ssp ***allardi*** Oberthür

Zygaena Allardi Oberthür, 1878, *Et. d'Ent.* **3** : 41 (Suppl.), pl. 5, fig. 5.

(Pl. 51, fig. 35)

Type: ♂ 23 mm. "Marcouna (Allard)"; "Zygaena allardi, Oberthür (Etudes d'Entomol. IIIe liv'on, pl. v, fig. 5. pages 41, 42—specimen typicum—"; "Vu par Staudinger Catalogue 1900"; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 518.

An examination of the genitalia showed *allardi* Obthr. to be conspecific with *orana* Dup.

Zygaena orana Dup. ssp. ***contristans*** Oberthür

Zygaena orana var. *contristans* Oberthür, 1922, *Lép. Comp.* **19** : 158, pl. 535, fig. 4456.

(Pl. 51, fig. 36)

Lectotype: ♀ 22 mm. "Maroc Mrassine H. Powel Avril 1921", there is only one "l" in "Powel" on the pin label, apparently due to an error of the printer. "Zygaena orana contristans Obthr."; "coll. Ch. Oberthür."; a figure of the specimen with the number "4456".
ex Rothschild collection. Slide No. 530.

Zygaena orana Dup. ssp. ***hajebensis*** Reiss & Tremewan

Zygaena orana ssp. *hajebensis* Reiss & Tremewan, 1960, *Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **9** (10) : 464, pl. 22, figs. 11, 12.

(Pl. 51, fig. 37)

Holotype: ♂ 23 mm. "El Hajeb, W. slopes of Middle Atlas, Maroc, 17.iv. 1929. (E. Hartert)."; "H. Type ♂ hajebensis Reiss et Tremewan 1959 H. Reiss".
ex Rothschild collection. Slide No. 528.

Zygaena youngi Rothschild

Zygaena youngi Rothschild, 1925, *Bull. Soc. Sci. nat. Maroc.* **5** : 338.
Zygaena orana media Rothschild, 1925, *Bull. Soc. Sci. nat. Maroc.* **5** : 338.
Zygaena orana var. ***rothschildiana*** Reiss, 1930, *in* Seitz, *Macrolep.*, Suppl. **2** : 26 (new name for ***media*** Roths. [preoccupied]).

[youngi]

(Pl. 51, fig. 38)

Type : ♂ 23 mm. " Above Azrou, Middle Atlas, 1800 m. 1.vi. 25. (Hartert & Young)." ; " Zygaena youngi Rothsch. Type " ; " Original zur Abbildung des Z. youngi ♂ im Seitz, Suppl., Bd. 2, Tafel 3a 1930. H. Reiss.".
ex Rothschild collection. Slide No. 340, Pl. 61, figs. 1, 2.

[media]

(Pl. 51, fig. 39)

Type : ♂ 22 mm. " Lake Sidi Ali, Middle Atlas, 2250 m. 8.VI. 25. (Hartert & Young.)" ; " Z. orana media Rothsch. Type ".
ex Rothschild collection. Slide No. 535.

A study of the genitalia of the type of *media* showed it to be conspecific with *youngi* Roths. (*vide Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **9** (10) : 464).

Zygaena harterti Rothschild

Zygaena harterti Rothschild, 1925, *Bull. Soc. Sci. nat. Maroc.* **5** : 338.

(Pl. 52, fig. 1)

Type : ♂ 26 mm. " Azrou, Middle Atlas, 1800 m. 29.V. 25. (Hartert & Young)." ; " Zygaena harterti Rothsch. Type " ; " Original zur Abbildung des Z. harterti ♂ im Seitz, Suppl., Bd. 2, Tafel 3a 1930. H. Reiss.".
ex Rothschild collection. Slide No. 339, Pl. 61, figs. 3, 4.

Zygaena maroccana Rothschild

Zygaena carniolica maroccana Rothschild, 1917, *Novit. zool.* **24** : 342.

(Pl. 52, fig. 2)

Type : ♀ 31 mm. " Mogador Marokko " ; " Z. carniolica maroccana Rothsch. Type " ; " Original zur Abbildung des Z. maroccana ♀ im Seitz, Suppl., Bd. 2, Tafel 20 1930. H. Reiss.".
ex Rothschild collection. Slide No. 407, Pl. 64, fig. 7.

The genitalia were badly damaged before dissection, and only the ostium remains.

Zygaena occitanica de Villers

Sphinx Occitanica de Villers, 1789, *Carol. Linn. Entomol.* **2** : 114, pl. 4, fig. 21.

Zygaena occitanica de Vill. ab. **bicolor** Oberthür

Zygaena carniolica-bicolor Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 114.

(Pl. 52, fig. 3)

Type: ♂ 27 mm. " Basses-Alpes Env. de Digne Juillet 1904 Victor Cotte " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 114 " ; " coll. Ch. Oberthür. ".
ex Rothschild collection. Slide No. 537.

An examination of the genitalia showed this specimen to be an aberration of *occitanica* de Vill.

Zygaena carniolica Scopoli

Sphinx Carniolica Scopoli, 1763, *Ent. carniol.*, p. 189.

Zygaena carniolica Scop. ssp. **diniensis** H.-S. ab. **melusina** Oberthür

Zygaena carniolica-melusina Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 119.

(Pl. 52, fig. 4)

Lectotype: ♀ 27 mm. " Basses-Alpes Env. de Digne Victor Cotte 1904 " ; " Z. carniolica-melusina, Obthr. type 119 " ; " A servi de Modèle à J. Culot de Genève, pour le IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 119 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 542.

Zygaena carniolica Scop. ssp. **diniensis** H.-S. ab. **dupuyi** Oberthür

Zygaena carniolica-Dupuyi Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 110.

(Pl. 52, fig. 5)

Type: ♀ 29 mm. " Chasseurs de Digne Juillet 1897 " ; " Zygaena carniolica Dupuyi, Obthr. type." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 110 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 541.

Zygaena carniolica Scop. ssp. **modesta** Bgff. ab. **detschi** Oberthür

Zygaena carniolica-Detschi Oberthür, 1910, *Lép. Comp.* **4** : 636, pl. 51, fig. 442.

(Pl. 52, fig. 6)

Type: ♂ 29 mm. " Stuttgart (Alois Detsch) fin Juillet 1909 " ; " ab. Detschi, Obthr. Lépidopt. compar. Pl. LI. Vol. IV.", on the reverse side of the latter label is a figure of the specimen with the number " 442 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 540.

Zygaena carniolica Scop. ssp. **valesiae** Bgff. ab. **amoena** Staudinger

Zygaena carniolica ab. *amoena* Staudinger, 1887, *Berl. ent. Z.* **31** : 39.
Zygaena carniolica ab. *tricolor* Oberthür, 1904, *Lép. Comp.* **1** : 52, pl. 3, fig. 30.

[tricolor]

(Pl. 52, fig. 7)

Type : ♀ 30 mm. " Juillet, Martigny " ; " Reçu de Wullschlegel de Martigny (Valais) " ; " Zygaena carniolica ab. tricolor, Obthr. Lépid. comparée, pl. III fig. 30" ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 539.

Zygaena carniolica Scop. ssp. **valesiae** Bgff. ab. **weileri-tricolor** Oberthür

Zygaena Carniolica ab. *Weileri tricolor*, Oberthür, 1904, *Lép. Comp.* **1** : 52, pl. 3, fig. 32.

(Pl. 52, fig. 8)

Type : ♂ 28 mm. " Juillet/Martigny " ; " Reçu de Wullschlegel de Martigny (Valais) " ; " Zygaena carniolica transitus inter tricolor & Weileri—Lepid. comp. pl. III. fig. 32 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 703.

Zygaena carniolica Scop. ssp. **onobrychis** Esp. ab. **totirubra** Seitz

Zygaena carniolica ab. *totirubra* Seitz, 1910, *Macrolep.* **2** : 30, pl. 8f.

(Pl. 52, fig. 9)

Type : ♂ 25 mm. " Hungary " ; " 478 " ; " totirubra Seitz (ab.) " ; " type Seitz ".
ex Rothschild collection. Slide No. 536.

Zygaena carniolica Scop. ssp. **onobrychis** Esp. ab. **asymetrica** Oberthür

Zygaena carniolica-asymetrica Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 118.

(Pl. 52, fig. 10)

Type : ♀ 28 mm. " Ofen " ; " 466 " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII fig. 118 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 538.

Zygaena carniolica Scop. ssp. **hedysari** Hübn. ab. **apenina** Oberthür

Zygaena Carniolica ab. *Apenina* Oberthür, 1910, *Lép. Comp.* **4** : 633 (with reference to *Et. d'Ent.* **20**, pl. 7, fig. 114).

The type figured in *Etudes d'Entomologie*, **20**, pl. 7, fig. 114 cannot be found and I assume that it is lost. The aberration is transitional to ab. *apennina* Turati.

However, the specimen figured pl. 7, fig. 117, is in the Oberthür collection and is ssp. *hedysari* Hübn. ab. *pseudoberolinensis* Burgeff. Both specimens were described from Piedmont.

Zygaena carniolica Scop. ssp. ***siciliana*** Reiss

Zygaena carniolica var. *siciliana* Reiss, 1921, *Int. ent. Z.* **15** : 39.
Anthocere [*sic*] *carniolica sicilica* Ragusa, 1924, *Boll. Lab. Zool. Portici.* **18** : 94.

[sicilica]

(Pl. 52, fig. 11)

Lectotype : ♂ 28 mm. " Prov. Messina. Local. . . . Data 25.6. 1919. coll. E. Ragusa " ; " Sicily, coll. E. Ragusa.".
ex Rothschild collection. Slide No. 672.

Zygaena carniolica Scop. ssp. ***praestans*** Oberthür

Zygaena carniolica race *praestans* Oberthür, 1910, *Lép. Comp.* **4** : 637.

(Pl. 52, fig. 12)

Lectotype : ♀ 32 mm. " Syrie, Akbès Ch. Delagrange Eté 1890 " ; " praestans Obthr. Lépid. comparée IV–1910." ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No. 116 " ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 543.

Zygaena exulans Reiner & Hohenwarth

Sphinx exulans Reiner & Hohenwarth, 1792, *Botan. Reisen*, p. 265, pl. 6, fig. 2.

Zygaena exulans R. & H. ab. ***pallida*** Tutt

Zygaena exulans ab. *pallida* Tutt, 1897, *Ent. Rec.* **9** : 14.

(Pl. 52, fig. 13)

The type is not in the British Museum. The specimen I figure is a female and is labelled " Grausou, 1895. ex coll. Tutt." ; " ab. pallida, Tutt. (cotypes) N. Hist. Brit. Lep. 1. p. 449 ".
ex Rothschild collection. Slide No. 665.

This specimen could possibly be from syntype material, but Tutt did not mention Grauson, erroneously spelt " Grausou " on the pin label, in his description.

Zygaena exulans R. & H. ab. ***clara*** Tutt

Zygaena exulans ab. *clara* Tutt, 1894, *Ent. Rec.* **5** : 266.

The type is not in the British Museum. The aberration, which was described from the Swiss Alps, is well scaled and brightly coloured in both sexes ; the females are without the whitish markings on the thorax and veins of the fore wings.

Zygaena exulans R. & H. ssp. ***subochracea*** White

Zygaena exulans var. *subochracea* White, 1872, *Scot. Nat.* **1** : 174.
Zygaena exulans var. *rubbedaria* Tutt, 1894, *Proc. ent. Soc. Lond.*, p. xxvii.

[subochracea]

(Pl. 52, fig. 14)

Lectotype : ♂ 25 mm. " Braemar, 1871 ex coll. Tutt." ; " type from F. B. White (Braemar 1871) ".
ex Rothschild collection. Slide No. 440.

According to the data, this specimen was sent to Tutt by Buchanan White, and I have no hesitation in taking it as an original specimen.

[rubbedaria]

This name was applied by Tutt to subdiaphanous specimens of the Scottish race *subochracea* White, which in my opinion were worn ; consequently I treat it as a synonym.

Zygaena exulans R. & H. ssp. ***altaratensis*** Le Charles ab. ***striata*** Tutt

Zygaena exulans ab. *striata* Tutt, 1896, *Proc. ent. Soc. Lond.*, p. xli.
Zygaena exulans ab. *confluens* Oberthür, 1910, *Lép. Comp.* **4** : 482.

[striata]

(Pl. 52, fig. 15)

Lectotype : ♀ 27 mm. " Le Lautaret, 1–6. Aug. 1896. ex coll. Tutt." ; " Extreme form ab. striata ".
ex Rothschild collection. Slide No. 441.

[confluens]

(Pl. 52, fig. 16)

Type : ♀ 30 mm. " Ex. Musaeo Ach. Guenée " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 656.

In his description, Oberthür stated that the specimen came from the Simplon.

Zygaena exulans R. & H. ssp. ***altaratensis*** Le Charles ab. ***pulchra*** Tutt

Anthrocera exulans ab. *pulchra* Tutt, 1899, *Brit. Lep.* **1** : 448.

(Pl. 52, fig. 17)

Type : ♀ 31 mm. " Le Lautaret, 1–6. Aug. 1896. ex coll. Tutt." ; " ab. pulchra Tutt N. Hist Brit Lep. 1.448 type. unique Le Lautaret Aug 6. 96 ".
ex Rothschild collection. Slide No. 442.

Zygaena exulans R. & H. ssp. **altaratensis** Le Charles ab. **minor** Tutt

Anthrocera exulans ab. *minor* Tutt, 1899, *Brit. Lep.* **1** : 449.

(Pl. 52, fig. 18)

Lectotype : ♂ 22 mm. " Le Lautaret, 1–6 Aug. 1896. ex coll. Tutt." ; " ab. minor. Tutt (cotypes) Nat Hist. Brit Lep. 1.449 ".
ex Rothschild collection. Slide No. 443.

Zygaena exulans R. & H. ssp. **altaratensis** Le Charles ab. **flavilinea** Tutt

Zygaena exulans var. *flavilinea* Tutt, 1894, *Ent. Rec.* **5** : 267.

(Pl. 52, fig. 19)

The type is not in the British Museum. The specimen I figure here is a female, and is labelled " Le Lautaret, 1–6 Aug. 1896. ex coll. Tutt." ; " ab. flavilinea Tutt. (Nat. Hist. Brit. Lep. 1 : 448 (types) ".
ex Rothschild collection. Slide No. 664.

Although labelled " types " by Tutt, the specimen was captured after the description was published.

Zygaena exulans R. & H. ssp. **altaratensis** Le Charles ab. **flava** Oberthür

Zygaena exulans ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20** : 43, pl. 8, fig. 141.

(Pl. 52, fig. 20)

Type : ♂ 28 mm. " Lautaret Emm. Martin " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8, No 141 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 444.

Zygaena loti Schiffermüller & Denis

Sphinx loti Schiffermüller & Denis, 1775, *Wien. Verz.*, p. 45.

Zygaena loti S. & D. ssp. **miniacea** Oberthür

Zygaena achilleae race *miniacea* Oberthür, 1910, *Lép. Comp.* **4** : 462.

(Pl. 52, fig. 21)

Lectotype : ♂ 31 mm. " Charente-Inférieure Dompierre-sur-Mer P. Boulé 8–15. VI. 1907 " ; " miniacea Obthr. Lépid. compar. IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 465.

Zygaena loti S. & D. ssp. **miniacea** Obthr. ab. **flava** Oberthür

Zygaena achilleae ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20** : 43, pl. 8, fig. 140.

(Pl. 52, fig. 22)

Lectotype: ♂ 32 mm. " EX. MUSAEO Dris BOISDUVAL "; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 140 "; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 464.

The lectotype has no locality label but according to Oberthür the specimen came from Bondy, near Paris. As stated by Oberthür, there are seven specimens in the collection. Five of these specimens are from the Bellier collection, four of which are labelled " Paris ". One specimen is from the de Graslin collection and is labelled " v. bellis Becker " and " achilleae ", while the specimen selected as lectotype originated from the Boisduval collection as stated above.

Zygaena loti S. & D. ssp. ***achillalpina*** Burgeff

Zygaena achilleae var. *achillalpina* Burgeff, 1926, *Mitt. münchen. ent. Ges.* **16** : 34 (new name for *alpina* Obthr. [preoccupied]).
Zygaena achilleae race *alpina* Oberthür, 1910, Lép. Comp. **4** : 466.

(Pl. 52, fig. 23)

Lectotype: ♂ 31 mm. " Env. de Digne A. Coulet 1901 "; " alpina Obthr. Lépidopt. comparée achilleae, Bdv. Icones, Pl. 53. fig. 6."; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 466.

Zygaena loti S. & D. ssp. ***janthina*** Boisduval

Zygaena janthina Boisduval, 1829, *Mon. Zyg.*, p. 45, pl. 8, fig. 7.

(Pl. 52, fig. 24)

Type: ♂ 28 mm. " Janthina "; " EX. MUSAEO Dris. BOISDUVAL "; " Vu par Staudinger Catalogue 1900 "; " coll. Ch. Oberthür.", and a label in Oberthür's hand " Janthina Boisduv. type—Essai Monogr. Zygèn. Pl. VIII. fig. 7—Obthr. Lépid. compar. IVe liv'on 1910 ".

ex Rothschild collection. Slide No. 470.

Described from Oysans and the Alps of Provence.

Zygaena loti S. & D. ssp. ***wagneri*** Mill. ab. ***sexmacula*** Dziurzynski

Zygaena wagneri f. *sexmacula* Dziurzynski, 1908, *Berl. ent. Z.* **53** : 22.
Zygaena achilleae wagneri ab. *quadrimaculata* Oberthür, 1910, *Lép. Comp.* **4** : 471.

[quadrimaculata]

(Pl. 52, fig. 25)

Lectotype: ♂ 33 mm. " Alpes-Maritimes Decoster, 1907 Mt Pacanaglia 10–18 Juin "; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 467.

Zygaena loti S. & D. ssp. **tristis** Oberthür

Zygaena Achilleae var. *tristis* Oberthür, 1884, *Et. d'Ent.* **8** : 29.

(Pl. 52, fig. 26)

Lectotype : ♂ 31 mm. " Hautes-Pyrénées Cauterets R. Oberthür Juillet 1883 " ; " var. tristis Obtr." ; " Vu par Staudinger Catalogue 1900 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 468.

Zygaena loti S. & D. ssp. **tristis** Obthr. ab. **brunnea** Oberthür

Zygaena Achilleae var. *tristis* ab. *brunnea* Oberthür, 1910, *Lép. Comp.* **4** : 464.

(Pl. 52, fig. 27)

Type : ♂ 30 mm. " Hautes-Pyrénées Env. de Cauterets 28 Juin—11 Juill. 99 Charles Oberthür." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 469.

Zygaena loti S. & D. ssp. **aspera** Bgff. f.t. **italica-aestivalis** Oberthür

Zygaena achilleae race *italica-aestivalis* Oberthür, 1910, *Lép. Comp.* **4** : 662.

(Pl. 52, fig. 28)

Lectotype : ♂ 25 mm. " Italie méridionale Roccaroso et Palena fin Juillet et Août 1907 Fabresse " ; " Achilleae italica-aestivalis Obthr. IV liv., Lépidopt. comparée (addenda) " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 471.
The correct name is *italica-aestivalis* Obthr. and not *aestivalis auct.*

Zygaena loti S. & D. ssp. **castellana** Stauder

Zygaena achillea [*sic*] ssp. *castellana* Stauder, 1929, *Ent. Z.* **43** : 79.

(Pl. 52, fig. 29)

Type : ♀ 33 mm. " Teriol. m. Seiseralpe 30/7. 1928 1500 m H. Stauder " ; " achilleae ss. castellana Stdr. Type ".
ex Rothschild collection. Slide No. 472.

Zygaena loti S. & D. ssp. **restricta** Stauder

Zygaena achilleae restricta Stauder, 1915, *Z. wiss. InsektBiol.* **11** : 71.
Zygaena hybr. f. *punctachilleae* Stauder, 1929, *Ent. Z.* **43** : 30.
Zygaena hybr. f. *punctmeliloti* Stauder, 1929, *Ent. Z.* **43** : 31.
Zygaena hydr. f. *melilorestricta* Stauder, 1929, *Ent. Z.* **43** : 31.

[punctachilleae]

(Pl. 52, fig. 30)

Lectotype : ♂ 28 mm. " Italia mer. penins. Sorrento Mte Faito 10.6. 1921 1000 m. H. Stauder " ; " 6829 " ; " Type Zygaena hybr. punctachilleae Stdr. ex punctum × achilleae ".

ex Rothschild collection. Slide No. 688.

There are two further specimens, one from the same locality as the lectotype, labelled " Ital. mer. pen.—Sorrentina 10.6. 1913 H. Stauder " ; " Type hybr. Zyg. punctachilleae Stdr. Produkt ex punctum × achilleae " ; " 8289 ".

The third specimen is labelled " Litorale austr. Repentabor Altipiano 14.6. 1912. H. Stauder " ; " Zyg. hybr. punctachilleae Stdr. ex. punctum × achilleae Type ".

[punctmeliloti]

(Pl. 52, fig. 31)

Lectotype : ♂ 29 mm. " Italia mer. penins. Sorrento Mte. Falto 5.7. 1928 H. Stauder collo f. 950 m " ; " Type hybr. punctmeliloti Stdr." ; " 6821 ". Erroneously described as a female.

ex Rothschild collection. Slide No. 689.

There are two further specimens, one labelled " Litorale austr. Repentabor Altipiano 14.6. 1912. H. Stauder " ; " 6823 " ; " hybr. punctmeliloti Stdr. Type.". This specimen was erroneously stated to be a female in the description. The third specimen is labelled " Italia mer. penins. Sorrento. Mte. Falto. Collo f. 950 m. 30.6. 1928. H. Stauder " ; " 6822 ".

Mte. Faito is erroneously spelt " Mte. Falto " on the pin labels.

[melilorestricta]

(Pl. 52, fig. 32)

Lectotype : ♂ 28 mm. " Italia mer. penins. Sorrento Mte Falto 2.7. 1928. H. Stauder Collo f. 950 m " ; " 6832 " ; " hybr. melilorestricta Stdr.".

ex Rothschild collection. Slide No. 475.

There are three further specimens taken at the same locality but dated " 28.6. 1928 " and additionally labelled " 6830 " ; " 6831 " ; " 6833 ".

Mte. Faito is erroneously spelt " Mte Falto " on the pin labels.

All the supposed hybrids of Stauder were captured wild and were not bred. I have examined the genitalia and find them quite normal and I consider the specimens normal. As the specimens do not differ from the normal race in superficial characters I treat all the names as synonyms.

Subg. ***ZYGAENA*** Fabricius

Zygaena graslini Lederer

Zygaena Graslini Lederer, 1855, *Verh. zool.-bot. Ges. Wien*, **5** : 197, pl. 2, figs. 3, 4.

Zygaena graslini Led. ab. *confluens* Oberthür

Zygaena Graslini ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20** : 46, pl. 7, fig. 128.

(Pl. 52, fig. 33)

Type : ♂ 28 mm. " Syrie Akbès 1891 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol Pl. 7 No. 128 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 479.

Zygaena anthyllidis Boisduval

Zygaena anthyllidis Boisduval, 1829, *Mon. Zyg.*, p. 78, pl. 4, fig. 8.

(Pl. 52, fig. 34)

Lectotype : ♂ 35 mm. " Anthyllidis. B.D." ; " EX. MUSAEO Dris BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 477, Pl. 61, figs. 5, 6.

The species is not found in Southern Spain as stated by Boisduval. Barèges in the High Pyrenees should be taken as the type locality as this was mentioned by Boisduval in 1834, *Icones*, **2** : 69.

Zygaena rhadamanthus Esper

Sphinx rhadamanthus Esper, 1793, *Die Schmett.* Suppl. **2** (2) : 13, pl. 40, figs. 1, 2.

Zygaena rhadamanthus Esp. ssp. *stygia* Bgff. ab. *quinquemaculata* Oberthür

Zygaena rhadamanthus ab. *quinquemaculata* Oberthür, 1910, *Lép. Comp.* **4** : 595 (with reference to *Lép. Comp.* **3**, pl. 29, figs. 181, 183).

(Pl. 52. fig. 35)

Lectotype : ♂ 30 mm. " Alpes-Maritimes, Mont Pacanaglia 7–8–10 Juin 1906 R. Powell " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 183 " ; " Zygaena Rhadamanthus Kiesenwetteri, H–S. no 96 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 481.

Zygaena rhadamanthus Esp. ssp. *stygia* Bgff. ab. *obscura* Oberthür

Zygaena rhadamanthus ab. *obscura* Oberthür, 1910, *Lép. Comp.* **4** : 595.

(Pl. 52, fig. 36)

Type : ♂ 28 mm. " Alpes-Maritimes La Turbie-Laghet 6–8 Juin 1906 R. Powell " ; " Ab. obscura, Obthr. Lépid. compar. IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 482.

Zygaena rhadamanthus Esp. ssp. **grisea** Oberthür

Zygaena Rhadamanthus-grisea Oberthür form *cingulata* Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 187.

(Pl. 53, fig. 1)

Type: ♀ 29 mm. "Chasseurs de Digne Juin 1897"; "A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 187"; "Zygaena Rhadamanthus-grisea Obthr. forma: cingulata."; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 484.

It is unfortunate that Oberthür, when publishing the name *grisea*, figured the aberration *cingulata*, as this will have to be taken as the typical form of the race and the name *cingulata*, which has no nomenclatural status, must be disregarded.

Zygaena rhadamanthus Esp. ssp. **grisea** Obthr. ab. **guenéei** Oberthür

Zygaena Rhadamanthus-Guenéei Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, figs. 185, 186 (with reference to Guenée, *Ann. Soc. ent. Fr.* 1870, pl. 7, fig. 12).
Zygaena Rhadamanthus ab. *Guenéei* Oberthür, 1910, *Lép. Comp.* **4** : 587.

(Pl. 53, fig. 2)

Type: ♂ 25 mm. "Celles les Bains" and a label in Guenée's hand "la très curieuse aberration No 5 a été prise par moi à Celles, sortant de la chrysalide or je n'ai vu un second individu dont je n'ai pu m'emparer. Je l'ai publié dans les annales"; "Ex. Musaeo Ach. Guenée"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 483.

When publishing the name *guenéei*, Oberthür figured two specimens from Digne, and at the same time referred to Guenée's specimen. In 1910 (*Lép. Comp.* **4** : 587), he described the aberration attributing the name to this specimen. From this evidence I consider the Guenée specimen to be the type.

Zygaena rhadamanthus Esp. ssp. **alfacarensis** Reiss ab. **flava** Oberthür

Zygaena Rhadamanthus-flava Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 184.

(Pl. 53, fig. 3)

Type: ♂ 28 mm. "Tijola (Alméria) Escalera 1900"; "A servi de Modèle à J. Pulot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Cl. XXIX fig. 184"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 480.

Zygaena rhadamanthus Esp. ssp. **barcina** Vrty. ab. **kiesenwetterii** Herrich-Schäffer

Zygaena kiesenwetterii Herrich-Schäffer, 1851, *Schmett. Europa*, **2**, pl. 14, figs. 97, 98.
Zygaena Kiesenwetteri Herrich-Schäffer, 1852, *Schmett. Europa*, **6** : 46.
Zygaena staechadis Boisduval, 1834, *Icones*, **2** : 71, pl. 55, fig. 4, (preoccupied).

[staechadis]

(Pl. 53, fig. 4)

Type : ♂ 30 mm. " Barcelone " ; " Staechadis. O.B. Lavandulae. H. " ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 485.

Boisduval described *staechadis* as a good species and did not confuse it with the *stoechadis* of other authors. It is, however, preoccupied by *stoechadis* Borkh., 1793, and the name *kiesenwetterii* H.-S. must be used.

Zygaena oxytropis Boisduval

Zygaena oxytropis Boisduval, 1829, *Mon. Zyg.*, p. 89, pl. 5, fig. 7.

(Pl. 53, fig. 5)

Type : ♂ 24 mm. " Oxytropis. B.D." ; " EX. MUSAEO Dris BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 478, Pl. 62, figs. 1, 2.

Boisduval gave no indication of the exact locality in his description but stated that the species was found at Piedmont and Italy and that specimens had been taken in the neighbourhood of Rome and Tuscany. In 1834 (*Icones*, **2** : 70), Boisduval stated that specimens were found in the neighbourhood of Florence, in Tuscany. The subspecies from Tuscany, above Florence, should be considered the nominate race as it agrees well with Boisduval's description and the type, *vide* Verity, 1920 (*Ent. Rec.* **32** : 159).

Zygaena theryi de Joannis

Zygaena Theryi de Joannis, June 1908, *Bull. Soc. ent. Fr.*, p. 203.
Zygaena lavandulae nisseni Rothschild, August 1908, *Entomologist*, **41** : 185.

[nisseni]

(Pl. 53, fig. 6)

Type : ♂ 28 mm. " Type ♂ Z. lav. nisseni Entomologist Aug. 1908 p. 185 Hamman R'Irha 26.5. 1908 ".
ex Rothschild collection. Slide No. 488, Pl. 62, figs. 3, 4.

Originally described by Rothschild as a subspecies of *lavandulae* Esp., but has since proved to be a good species. However, the name *nisseni* falls in synonymy under *theryi* de Joannis, which was published two months earlier. De Joannis described *theryi* from a female specimen taken in the neighbourhood of Philippeville.

Zygaena lavandulae Esper

Sphinx lavandulae Esper, 1783, *Die Schmett.* **2** : 221, pl. 34, fig. 2.

Zygaena lavandulae Esp. ab. ***siepii*** Oberthür

Zygaena lavandulae-Siepii Oberthür, 1909, *Lép. Comp.* **3**, pl. 28, fig. 162.

(Pl. 53, fig. 7)

Type : ♂ 32 mm. "Vallons de St. Pons Dr. Siepi 11 Juin 1906." ; "acheté par R. Oberthür en mai 1907 dix jours avant son arrestation" ; "Zygaena lavandulae-Siepii Obthr. type" ; "A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII no 162" ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 486.

Zygaena lavandulae Esp. ab. ***powelli*** Oberthür

Zygaena lavandulae ab. *Powelli* Oberthür, 1910, *Lép. Comp.* **4** : 586.

(Pl. 53, fig. 8)

Type : ♂ 32 mm. "Alpes-Maritimes-Entre le Laghet et les moulins Gaetti. 1906. 13 juin Harold Powell." ; "Ab. Powelli, Obthr. IVe Vol. Lépid. compar. 1910." ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 487.

Zygaena ephialtes Linnaeus

Sphinx Ephialtes Linnaeus, 1767, *Syst. Nat.*, ed. XII, p. 806.

Zygaena ephialtes L. ab. ***wullschlegeli*** Oberthür

Zygaena Ephialtes-Wullschlegeli Oberthür, 1909, *Lép. Comp.* **3**, pl. 29, fig. 176.

(Pl. 53, fig. 9)

Type : ♂ 33 mm. "Zygaena Ephialtes, 24/7 1907—Plancerisier. Martigny (Valais) ex/Wullschlegeli (Obthr) type" ; "A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXIX fig. 176" ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 721.

Zygaena ephialtes L. ab. ***falcatae*** Oberthür

Zygaena ephialtes ab. *falcatae* Oberthür, 1910, *Lép. Comp.* **4** : 572 (with reference to *Et. d'Ent.* **20**, pl. 7, fig. 113).
Zygaena ephialtes-falcatae Hübn., Obthr. *nec* Hübn., 1896, *Et. d'Ent.* **20**, pl. 7, fig. 113.

(Pl. 53, fig. 10)

Type: ♀ 38 mm. "Vernet-l-Bains R. Oberthür Juillet 1885."; "Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 7 No. 113"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 724.

This aberration differs from the *falcatae* of Hübner in having the outer spots of the fore wings tinged with carmine. Hübner's *falcatae* is a synonym of *medusa* Pallas.

Zygaena ephialtes L. ab. ***scheveni*** Oberthür

Zygaena ephialtes ab. *Scheveni* Oberthür, 1910, *Lép. Comp.* **4**: 570.

(Pl. 53, fig. 11)

Lectotype: ♀ 35 mm. "Zyg. var. sophiae ♀ Août/Martigny."; "Reçu de Wullschlegel de Martigny (Valais)"; "Scheveni Obthr. IV.-Lépid. compar. 1910"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 725.

As quoted above, there is a label on which is written "var. sophiae"; this is in Wullschlegel's hand.

Zygaena ephialtes L. ab. ***esperi*** Oberthür

Zygaena ephialtes ab. *Esperi* Oberthür, 1910, *Lép. Comp.* **4**: 570.

(Pl. 53, fig. 12)

Lectotype: ♀ 37 mm. "Zyg. ephialtes ♀. Août Martigny."; "Esperi Obthr. IV-Lépid. compar. 1910"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 722.

Zygaena ephialtes L. ab. ***pallens*** Oberthür

Zygaena ephialtes ab. *pallens* Oberthür, 1910, *Lép. Comp.* **4**: 576.

(Pl. 53, fig. 13)

Type: ♂ 31 mm. "Digne V. Cotte 1908"; "pallens, Obthr. Lépid. comparée IV–Mai 1910"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 723.

Zygaena ephialtes L. ssp. ***athamanthae*** Esp. ab. ***pallida*** Oberthür

Zygaena ephialtes ab. *pallida* Oberthür, 1910, *Lép. Comp.* **4**: 576.

(Pl. 53, fig. 14)

Type: ♂ 35 mm. "W. Philipp. Austr. inf. Wachau VII/07"; "pallida, Obthr., Lépid. comparée IV–Mai 1910"; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 694.

Zygaena ephialtes L. ssp. ***athamanthae*** Esp. ab. ***adalberti*** Oberthür

Zygaena ephialtes ab. *Adalberti* Oberthür, 1910, *Lép. Comp.* **4** : 574.

(Pl. 53, fig. 15)

Oberthür applied the name *adalberti* to the specimen illustrated by Seitz in 1910 (Seitz, *Macrolep.* **2**, pl. 6b).

I figure a specimen labelled *adalberti* by Oberthür, which has the following data : " W. Philipp Austr. inf. Wachau VII 07." ; " Adalberti, Obthr. icterica (par erreur) Seitz-Zygaena 6.b." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 695.

Zygaena ephialtes L. ssp. ***meridiei*** Bgff. ab. ***decolorata*** Stauder

Zygaena ephialtes ssp. *meridionalis* Bgff. f. *decolorata* Stauder, 1929, *Ent. Z.* **43** : 80 (*meridiei* Bgff. new name for *meridionalis* Bgff. [preoccupied]).

(Pl. 53, fig. 16)

Type : ♀ 38 mm. " Teriol. m. Castelrotto 800 m. 4/8. 1928 H. Stauder " ; " f.n.decolorata Stdr." ; " 6811 ".
ex Rothschild collection. Slide No. 696.

Zygaena transalpina Esper

Sphinx transalpina Esper, 1782, *Die Schmett.* **2** : 142, pl. 16, figs.

Zygaena transalpina Esp. ssp. ***maritima*** Oberthür

Zygaena maritima Oberthür, 1898, *Bull. Soc. ent. Fr.*, p. 22.
Zygaena xanthographa helvetica Rothschild & Bethune-Baker, 1920, *Proc. ent. Soc. Lond.*, p. xlix.

[maritima]

(Pl. 53, fig. 17)

Lectotype : ♂ 33 mm. " Alpes-Maritimes Nice (Turbie) V. Cotte Juin 1897 " ; " maritima, Ch. Obthr. Bull. Sté. Ent. France No 2—1898, p. 22–23 " ; " Vu par Staudinger Catalogue 1900 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 716.

[helvetica]

(Pl. 53, fig. 18)

Lectotype : ♂ 37 mm. " Moulinet " ; " 504 ".
ex Rothschild collection. Slide No. 720.

Zygaena transalpina Esp. ssp. ***maritima*** Obthr. ab. ***trimacula*** Reiss

Zygaena transalpina ssp. *maritima* ab. *trimacula* Reiss, 1930, *in* Seitz, *Macrolep.*, Suppl., **2** : 39 (new name for *trimaculata* Obthr. [preoccupied]).
Zygaena transalpina-maritima-3 *maculata* Oberthür, 1909, *Lép. Comp.* **3**, pl. 30, fig. 189.
Zygaena transalpina-maritima ab. *trimaculata* Oberthür, 1912, *Lép. Comp.* **6** : 188.

(Pl. 53, fig. 19)

Type : ♀ 37 mm. " Alpes-Maritimes Nice (Turbie) V. Cotte Juin 1897 " ; " Zygaena transalpina-maritima Obthr. 3-maculata XXX. 189 " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908-1909 Pl. XXX fig. 189 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 717.

Zygaena transalpina Esp. ssp. ***alpina*** Boisduval

Zygaena Alpina Boisduval, 1834, *Icones* **2** : 66, pl. 53, fig. 9.
Zygaena angelicae Ochs., Boisd. *nec* Ochs., 1834, *Icones*, **2** : 65, pl. 53, fig. 9.

This subspecies of *transalpina* was described from Grenoble (Isère) in the Alps. I cannot find the type in the Boisduval collection and assume that it is lost.

Zygaena transalpina Esp. ssp. ***alpina*** Boisd. ab. ***flava*** Oberthür

Zygaena transalpina-alpina-flava Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 39.

(Pl. 53, fig. 20)

Type : ♂ 36 mm. " Digne Coulet 1906 " ; " alpina-flava. Ann. Soc. ent. France, 1907.p.39." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 715.

The specimen figured in *Lép. Comp.*, **3**, pl. 30, fig. 200 was captured after the publication of the name and cannot be taken as the type.

Zygaena transalpina Esp. ssp. ***alpina*** Boisd. ab. ***grisescens*** Oberthür

Zygaena transalpina-grisescens Oberthür, 1920, *Lép. Comp.* **17** : 62, pl. 507, fig. 4248.

(Pl. 53, fig. 21)

Type : ♂ 31 mm. " Argentière août 1907 " ; " A servi de Modèle à J. Culot, pour le No 4248 de la Pl. DVII Vol. XVII, Etude de Lépidoptérologie comparée." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 697.

Zygaena transalpina Esp. ssp. ***sorrentina*** Stdgr. ab. ***impar*** Oberthür

Zygaena transalpina ab. *impar* Oberthür, 1911, *Lép. Comp.* **5** (1) : 206, pl. 62, figs. 569, 571.

(Pl. 53, fig. 22)

Lectotype : ♂ 31 mm. " Italle Central (Formia) Avril 1910. Métres 50 " ; " Zygaena Transalpina Maritima ADFLATA Turati " ; " Lépidoptérol. comparée V—Pl. LXII fig. 569 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 719.

Although the specimen is labelled "ADFLATA", it is one of the specimens to which Oberthür applied the name *impar*. The "ADFLATA" label is printed and was probably assigned to the specimen by the collector.

Zygaena transalpina Esp. ssp. ***sorrentina*** Stdgr. ab. ***aurantiaca*** Oberthür

Zygaena transalpina ab. *aurantiaca* Oberthür, 1911, *Lép. Comp.* **5** (1) : 208, pl. 62, fig. 583.

(Pl. 53, fig. 23)

Type : ♀ 35 mm. " S. Angelo 900 m. 29/6/07 " ; " Italie méridionale Fr. Zickert 1907 " ; " Lépidoptérolog. comparée V—Pl. LXII fig. 583." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 718.

Erroneously recorded in the description as having been captured " 29 mai 1907 ".

Zygaena transalpina Esp. ssp. ***altitudinaria*** Turati f.t. ***aestivalis*** Oberthür

Zygaena Transalpina-aestivalis Oberthür, 1910, *Lép. Comp.* **4** : 663.

(Pl. 53, fig. 24)

Lectotype : ♂ 28 mm. " Italie méridionale Roccaroso et Palena fin Juillet et Août 1907 Fabresse " ; " transalpina-aestivalis, Obthr-Lépid. comparée ; Vol. IV ; (Addenda) p. 663 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 714.

Zygaena transalpina Esp. ssp. ***athicaria*** Burgeff

Zygaena transalpina var. *athicaria* Burgeff, 1926, *Mitt. münchen. ent. Ges.* **16** : 79.
Zygaena transalpina ssp. *costazzina* Stauder, 1929, *Ent. Z.* **43** : 81.

[costazzina]

(Pl. 53, fig. 25)

Type : ♂ 30 mm. " Teriol. m. Seiseralpe 1600 m. 2/8. 1928 H. Stauder " ; " Type ssp. costazzina Stdr.".
ex Rothschild collection. Slide No. 698.

Zygaena hippocrepidis Hübner

Sphinx hippocrepidis Hübner, [1796]–[24th December 1799], *Europ. Schmett.* **2**, pl. 17, fig. 83.

Zygaena hippocrepidis Hübn. ssp. **centralis** Oberthür

Zygaena hippocrepidis-centralis Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 40.

(Pl. 53, fig. 26)

Lectotype : ♂ 30 mm. " Lardy Seine-&-Oise Lhotte 1896 " ; " Zygaena hippocrepidis-centralis, Obthr. Ann. Soc. ent. France 1907 p. 40, 41, 48 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 707.

Zygaena hippocrepidis Hübn. ssp. **centralis** Obthr. ab. **nigricans** Oberthür

Zygaena Hippocrepidis ab. *nigricans* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 146.

(Pl. 53, fig. 27)

Type : ♂ 28 mm. " Lardy 1886." ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 146 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 708.

Zygaena hippocrepidis Hübn. ssp. **centralis** Obthr. ab. **flava** Oberthür

Zygaena Hippocrepidis ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 144.

(Pl. 53, fig. 28)

Type : ♂ 30 mm. " Lardy (Seine & Oise) Emman. Martin." ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No 144 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 712.

Zygaena hippocrepidis Hübn. ssp. **provincialis** Oberthür

Zygaena hippocrepidis-provincialis Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 45.
Zygaena Transalpina f. *Meridionalis* Oberthür, 1911, *Lép. Comp.* **5** (1) : 213.

[provincialis]

(Pl. 54, fig. 1)

Lectotype : ♀ 27 mm. " Var Montrieux près Méounes 17–23 Septembre 1906 R. Powell " ; " hippocrepidis-provincialis. Ann. Soc. ent. France 1907—p. 45–48 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 710.

[meridionalis]

(Pl. 54, fig. 2)

Lectotype : ♂ 26 mm. " Var Montrieux près Méounes du 23 septembre au 4 octobre 1906 H. Powell " ; " Zygaena hippocrepidis-provincialis, Obthr XXX—192 " ;

" A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXX fig. 192 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 711.

Zygaena hippocrepidis Hübn. ssp. **occidentalis** Oberthür

Zygaena hippocrepidis-occidentalis Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 41.

(Pl. 54, fig. 3)

Lectotype : ♂ 31 mm. " Charente-Infre. Dompierre-sur-Mer P.Boulé Fin mai 1906." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 702.

I would have preferred, if it were possible, to have selected as the lectotype, the female figured by Oberthür in *Lép. Comp.* **3**, pl. 30, fig. 203. However, this specimen was taken after the publication of the name *occidentalis*.

Zygaena hippocrepidis Hübn. ssp. **occidentalis** Obthr. ab. **micingulata** Oberthür

Zygaena hippocrepidis-occidentalis ab. *micingulata* Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 42.

(Pl. 54, fig. 4)

Lectotype : ♀ 33 mm. " Dompierre-sur-Mer (Charente-Infre.) 30 Mai 1899 Th. Vigé " ; " Z. hippocrepidis-micingulata ; Ann. Soc. ent. France 1907. p. 42." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 709.

Again, I would have preferred to have selected as the lectotype the specimen figured by Oberthür in *Lép. Comp.* **3**, pl. 30, fig. 207. However, this specimen was taken in June, 1907, after the publication of the name.

Zygaena hippocrepidis Hübn. ssp. **occidentalis** Obthr. ab. **pallidior** Oberthür

Zygaena hippocrepidis-occidentalis ab. *pallidior* Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 43.

(Pl. 54, fig. 5)

Lectotype : ♀ 23 mm. " Dompierre-sur-Mer (Charente-Infre.) 17 Sept. 1900 Th. Vigé " ; " Z. hippocrepidis pallidior—Ann. Soc. ent. France. 1907. p. 43." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXX fig. 202 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 705.

Zygaena hippocrepidis Hübn. ssp. **occidentalis** Obthr. ab. **rosea** Oberthür

Zygaena hippocrepidis-occidentalis ab. *rosea* Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 43.

(Pl. 54, fig. 6)

Lectotype : ♂ 29 mm. " Dompierre-sur-Mer (Charente-Infre.) 25 Mai 1899 Th.

Vigé" ; "Z. hippocrepidis rosea—Ann. Soc. ent. France. 1907. p. 43" ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 706.

Zygaena hippocrepidis Hübn. ssp. ***occidentalis*** Obthr. ab. ***vigei*** Oberthür

Zygaena hippocrepidis-occidentalis ab. *Vigei* Oberthür, 1907, *Ann. Soc. ent. Fr.* **76** : 43.

(Pl. 54, fig. 7)

Lectotype : ♀ 30 mm. "Charente-Inférieure Dompierre-sur-Mer" ; "1896" ; "Z. hippocrepidis Vigéi,—Ann. Soc. ent. France 1907. p. 43." ; "A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909. Pl. XXX fig. 201" ; "Zygaena hippocrepidis-occident. Vigéi, Obthr. XXX. 201" ; "coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 704.

Zygaena viciae Schiffermüller & Denis

Sphinx viciae Schiffermüller & Denis, 1775, *Wien. Verz.*, p. 45.

Zygaena viciae S. & D. ssp. ***anglica*** Reiss ab. ***confluens*** Tutt

Anthrocera viciae (Schrank) ab. *confluens* Tutt, 1899, *Brit. Lep.* **1** : 456.

(Pl. 54, fig. 8)

The type is not in the British Museum and cannot be found. I figure a male labelled : "Lyndhurst New Forest 6.vi.1908".
ex Rothschild collection. Slide No. 666.

Zygaena viciae S. & D. ssp. ***anglica*** Reiss ab. ***sexpunctata*** Tutt

Anthrocera viciae (Schrank) ab. *sexpunctata* Tutt, 1899, *Brit. Lep.* **1** : 455.

(Pl. 54, fig. 9)

The type is not in the British Museum and cannot be found. I figure a female with the following data : "24" ; "ex coll. J. A. Clark dec.".
ex Whittle collection. Slide No. 659.

Zygaena viciae S. & D. ssp. ***teriolensis*** Speyer ab. ***decora*** Lederer

Zygaena meliloti ab. *Decora* Lederer, 1852, *Verh. zool.-bot. Ges. Wien*, **2** : 125.
Zygaena Charon var. *Cingulata* Frey, 1884, *Mitt. schweiz. ent. Ges.* **7** : 14.

[cingulata]

(Pl. 54, fig. 10)

Type : ♀ 28 mm. "Z. Charon var. Cingulata Stgr. Meran." ; "Frey Coll. 1890.".
Slide No. 533.

Zygaena viciae S. & D. ssp. ***giussana*** Stauder

Zygaena meliloti ssp. *giussana* Stauder, 1929, *Ent. Z.* **43** : 79.

(Pl. 54, fig. 11)

Type : ♂ 26 mm. " Italia mer. penins. Sorrento Mte. Falto 24.6. 1928 H. Stauder 1000 m " ; " meliloti v. giussana Stdr.".
ex Rothschild collection. Slide No. 534.

Mte. Faito is erroneously spelt " Mte. Falto " on the pin label.

Zygaena viciae S. & D. ssp. ***sicula*** Calb. ab. ***melilotoides*** Ragusa

Anthocere [*sic*] *sicula melilotoides* Ragusa, 1924, *Boll. Lab. Zool. Portici.* **18** : 93.

(Pl. 54, fig. 12)

Lectotype : ♂ 29 mm. " Prov. Mistretta Local. Salamone Data 25.6. 918. Coll. E. Ragusa " ; " Sicily, coll. E. Ragusa.".
ex Rothschild collection. Slide No. 673.

Zygaena viciae S. & D. ssp. ***sicula*** Calb. ab. ***cingulata*** Ragusa

Anthocere [*sic*] *punctum* ssp. *contamineoides* ab. *cingulata* Ragusa, 1924, *Boll. Lab. Zool. Portici.* **18** : 87.

(Pl. 54, fig. 13)

Type : ♀ 28 mm. " punctum contamineoid. forma confluenta (distrepta) e cingulata (nova) " ; " Sicily, coll. E. Ragusa.". Another label which I believe to have been written by Karl Jordan : " ab. confusa Stdgr. ad ab. stentzi Fr.".
ex Rothschild collection. Slide No. 671.

An examination of the genitalia showed the specimen to be conspecific with *viciae* S. & D.

Zygaena viciae S. & D. ssp. ***stentzii*** Freyer

Zygaena Dorycnii Stentzii Freyer, 1839, *Neue Beitr. zur. Schmett.* **3** : 120, pl. 278, fig. 4.

(Pl. 54, fig. 14)

Lectotype : ♂ 27 mm. " Stentzii " ; " Ex coll. Freyer ", a label in Rothschild's hand : " Freyer's type ".
ex Rothschild collection. Slide No. 675.

Described from the neighbourhood of Görz and Pontiebba. There are two specimens, one of these I designate as lectotype. The abdomens of both specimens are false, as the genitalia are of *carniolica* Scop.

Zygaena viciae S. & D. ssp. ***dahurica*** Boisduval

Zygaena dahurica Boisduval, 1834, *Icones*, **2** : 57, pl. 54, fig 7.

(Pl. 54, fig. 15)

Type : ♂ 32 mm. " Sibiria " ; " Dahurica B.d." ; " Dahurica " ; " EX. MUSAEO Dris. BOISDUVAL " ; " Vu par Staudinger Catalogue 1900 " ; " coll. Ch. Oberthür.", and a label in Oberthür's hand : "Zygaena Dahurica, Bdv. type.".
ex Rothschild collection. Slide No. 551, Pl. 63, figs. 5, 6.

Zygaena niphona Butler

Zygaena niphona Butler, 1877, *Ann. Mag. nat. Hist.* (4) **20** : 393.

(Pl. 54, fig. 16)

Type : ♂ 29 mm. " 77.9 Japan " ; " Z. Niphona Butler Type.".
Slide No. 559, Pl. 62, figs. 5, 6.

The type was described from Yokohama.

Zygaena gallica Oberthür

Zygaena Corycia Led. var. *gallica* Oberthür, 1898, *Bull. Soc. ent. Fr.*, p. 21.

(Pl. 54, fig. 17)

Lectotype : ♂ 25 mm. " Chasseurs de Digne Juin 1897 " ; " Zyg. gallica Ch. Obthr Bulli'n Sté Entom. France ; 1898 " ; " Vu par Staudinger Catalogue 1900 " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII no 173 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 434, Pl. 63, figs. 1, 2.

Zygaena dalmatina Boisduval

Zygaena dalmatina Boisduval, 1834, *Icones*, **2** : 45, pl. 54, fig. 2.

(Pl. 54, fig. 18)

Type : ♂ 27 mm. " Dalmatina " ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 435, Pl. 63, figs. 3, 4.

In his description, Boisduval stated that the specimen was taken at Ragusa, in Yugoslavia.

This species, together with ssp. *romeo* Dup., were formerly placed under *scabiosae* Scheven. However, in 1933, Reiss (Seitz, *Macrolep*, Suppl. **2** : 252) considered *romeo* Dup. as the species name. Scheven gave the name *scabiosae* to specimens from Regensburg which were illustrated by Schäffer as *purpuralis* (*Icones Insectorum Ratisbonensium*, pl. 16, figs. 4, 5). As the illustrations of Schäffer are so distinct no doubt is possible. The *purpuralis* still occurs at Regensburg, while *scabiosae auct.* does not occur there. Even if it were found at Regensburg in the time of Schäffer, it must have been so rare that it could not have predominated, so it is reasonable to assume that Schäffer took the commoner species for his illustrations.

However, the name *dalmatina* Boisd. has priority over *romeo* Dup., the latter name having been published a year later in 1835. It follows that *romeo* will return to subspecific rank and *dalmatina* must be used to designate the species.

An examination of the genitalia of the type of *dalmatina* has shown that it is not conspecific with *punctum* Ochs. as was suggested by Holik (1935, *Ent. Rdsch.* **53** : 56).

Zygaena filipendulae Linnaeus

Sphinx filipendulae Linnaeus, 1758, *Syst. Nat.*, ed. X, p. 494 (with reference to *Fauna Suecica*, p. 256, 1746).

Zygaena filipendulae L. ssp. ***anglicola*** Tremewan

Zygaena filipendulae ssp. *anglicola* Tremewan, 1960, *Ent. Gaz.* **11** (4) : 189.
Zygaena filipendulae ssp. *tutti* Rebel, *auctorum nec* Rebel.

(Pl. 54, fig. 19)

Holotype : ♂ 35 mm. " Tring, Herts., 27.vii. 06 (A. T. Goodson)." ; " Z. filipendulae ssp. anglicola Tremewan. Holotype ♂. det. W. G. Tremewan, 1959.".
ex Rothschild collection. Slide No. 685.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. ab. ***grisescens*** Oberthür

Zygaena filipendulae ab. *grisescens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 135.

(Pl. 54, fig. 20)

Type : ♂ 34 mm. " Angleterre Ex. coll. Wm. Prest d'York " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8, No. 135 " ; " ab. grisescens Obthr " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 580.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. ab. ***confluens*** Oberthür

Zygaena filipendulae ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 132.

(Pl. 54, fig. 21)

Type : ♂ 33 mm. " Angleterre ex. Coll. Howard Vaughan vendue Salle Stevens 22 & 23 Avril 1890 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 132 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 545.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. ab. ***proconfluens*** Tutt

Anthrocera filipendulae ab. *proconfluens* Tutt, 1899, *Brit. Lep.* **1** : 512.

(Pl. 54, fig. 22)

Lectotype : ♂ 34 mm. " Deal. L.95 " ; " Deal 1895 ex coll. Tutt " ; " ab. proconfluens, Tutt (types) (1, 2 + 3 + 4 + 5, 6) Deal. inbred '96–'97 (W. H. B. Fletcher) (see Nat. H.B. Lep. 1.512)".
ex Rothschild collection. Slide No. 577.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **quinquejuncta** Tutt

Anthrocera filipendulae ab. *quinquejuncta* Tutt, 1899, *Brit. Lep.* **1** : 512.

(Pl. 54, fig. 23)

Lectotype : ♀ 38 mm. " Deal bred in C96 " ; " Deal. ✱ 1896 ex. coll. Tutt " ; " ab. quinquejuncta, Tutt (types) (1, 1 + 2 + 3 + 4 +5 + 6) inbred Deal '96–'97 (W.H.B. Fletcher) see N.H.Brit.Lep. 1.512 ".
ex Rothschild collection. Slide No. 578.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **conjuncta** Tutt

Anthrocera filipendulae ab. *conjuncta* Tutt, 1899, *Brit. Lep.* **1** : 510.

The type is not in the British Museum. The aberration has all the spots of the fore wings joined to form an irregular single blotch.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **brunnescens** Cockayne

Zygaena filipendulae ab. *brunnescens* Cockayne, 1940, *Ent. Rec.* **52** : 91.

(Pl. 54, fig. 25)

Type : ♂ 35 mm. " R. GARNER. ORPINGTON. 17 JULY 1937 " ; " Type ab. brunnescens Cockayne ".
Slide No. 582.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **griseorosea** Cockayne

Zygaena filipendulae ab. *griseorosea* Cockayne, 1954, *Ent. Rec.* **66** : 68.

(Pl. 54, fig. 26)

Type : ♂ 30 mm. " Pont-llan-fraith 7.vii. 1906 No. 3556 W. Rait Smith." ; " Type ab. griseorosea Cockayne 1954 ".
Slide No. 581.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **nigrolimbata** Cockayne

Zygaena filipendulae ab. *nigrolimbata* Cockayne, 1954, *Ent. Rec.* **66** : 68.

(Pl. 54, fig. 27)

Type : ♂ 31 mm. " de la Coll. P. H. Harper Vendue Salle Stevens 20, 21 Mars 1884 " ; " Type ab. nigrolimbata Cockayne 1954 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 583.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. **spoliata** Cockayne

Zygaena filipendulae ab. *spoliata* Cockayne, 1954, *Ent. Rec.* **66** : 68.

(Pl. 54, fig. 24)

Type: ♂ 27 mm. "Nr. Tring, Herts. 7.viii. 1941. A. L. Goodson"; "Type ab. spoliata Cockayne 1954.".
Slide No. 576.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. ***miniata*** Tutt

Anthrocera filipendulae ab. *miniata* Tutt, 1899, *Brit. Lep.* **1** : 510.

The type is not in the British Museum. This aberration has the red replaced by a pinkish hue, often with traces of yellow and was suggested by Tutt to be a form with a pathological failure of pigment. The specimen figured under ab. *aurantia* Tutt has a label: "ab. miniata Tutt (Types) N.H.Brit. Lep. 510.". This specimen does not agree with the description of *miniata* and I assume that the label has been transposed.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. ***intermedia*** Tutt

Anthrocera filipendulae ab. *intermedia* Tutt, 1899, *Brit. Lep.* **1** : 510.

The type is not in the British Museum. In this aberration the red is replaced by salmon-red. A specimen from Sligo, ex collection Tutt and labelled "intermedia Tutt", does not agree with his description. The red coloration of this specimen is dull and the scales are twisted and deformed. I believe this effect has been caused by a killing agent, probably ammonia.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. ***trivittata*** Tutt

Anthrocera filipendulae ab. *trivittata* Tutt, 1899, *Brit. Lep.* **1** : 509.

(Pl. 54, fig. 29)

Type: ♀ 33 mm. "ab. intermedia-trivittata, Tutt described N.H.Brit. Lep. 1.509"; "26."; "ex coll. Tutt.".
ex Rothschild collection. Slide No. 676.

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. ***aurantia*** Tutt

Anthrocera filipendulae ab. *aurantia* Tutt, 1899, *Brit. Lep.* **1** : 510.

(Pl. 54, fig. 28)

The type is not in the British Museum. In this aberration the red is replaced by orange. The specimen I figure here is a male labelled "Great Britain".
ex Rothschild collection. Slide No. 579 (see ab. *miniata* Tutt).

Zygaena filipendulae L. ssp. **anglicola** Trmn. ab. ***flava*** Robson

Zygaena filipendulae v. *Flava* Robson, 1884, *Young Nat.* **5** : 236.
Zygaena filipendulae ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 133.

[flava Robson]

(Pl. 54, fig. 30)

Lectotype : ♂ 33 mm. " Robson Hartlepool ". Slide No. 681.

[flava Oberthür]

(Pl. 54, fig. 31)

Type : ♂ 30 mm. " Winchester O.C." ; " Angleterre ex Coll. Rév. G. H. Raynor vendue Salle Stevens 27 Octobre 1891 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 133 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 713.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. f.t. ***stephensi*** Dupont

Zygaena stephensi Dupont, 1900, *Bull. Soc. Sci. nat. Elbeuf.*, p. 77.
Anthrocera hippocrepidis Hübn., Stephens *nec* Hübn., 1828, *Illus. Brit. Ent.* **1** : 109.
Zygaena filipendulae v. (ab.) *tutti* Rebel, 1901, *in* Staudinger & Rebel's *Cat. Lep.*, p. 384.

(Pl. 54, fig. 34)

Lectotype : ♂ 35 mm. " Stephens Coll. Anthrocera hippocrepidis Steph. ♂ .j. named by Steph.".
ex Stephens collection. Slide No. 68.

The designation of the lectotype was published in 1958 (*Ent. Gaz.* **9** (4) : 194).

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. f.t. ***stephensi*** Dupont ab. ***minor*** Tutt

Anthrocera filipendulae ab. *minor* Tutt, 1899, *Brit. Lep.* **1** : 509.

(Pl. 54, fig. 35)

Lectotype : ♂ 27 mm. " Belleisle (Fermagh) 93 May " ; " Kane's types p. 509 " "ab. minor, Tutt (types) N.H.Brit Lep. 1.509 " ; " ex coll. Tutt.".
ex Rothschild collection. Slide No. 677.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. f.t. ***stephensi*** Dupont ab. ***lutescens*** Tutt

Anthrocera hippocrepidis Hübn., Tutt *nec* Hübn. ab. *lutescens* Tutt, 1899, *Brit. Lep.* **1** : 533.

Stephens (1828, *Illus. Brit. Ent.* **1** : 109) described a yellow aberration which Wood figured in 1839 (*Index Ent.*, pl. 4, fig. 6a). To this figure, Tutt applied the name *lutescens*. In the Stephens collection there is one yellow aberration which is, however, labelled " filipendulae ".

Zygaena filipendulae L. ssp. ***anglicola*** Trmn. f. loc. ***degenerata*** Tremewan

Zygaena filipendulae f. loc. *degenerata* Tremewan, 1958, *Ent. Gaz.* **9** (4) : 192.
Anthrocera hippocrepidis Hübn., Tutt *nec* Hübn., 1897, *Ent. Rec.* **9** : 87.

(Pl. 54, fig. 32)

Holotype : ♂ 29 mm. " Chattenden. Tutt. Coll. 25.v–24.vi. 92." ; " Zygaena filipendulae f.l. degenerata ♂ Holotype. sel. W. G. Tremewan, 1957.".
ex Tutt collection. Slide No. 585.

Zygaena filipendulae L. ssp. ***anglicola*** Trmn f. loc. ***degenerata*** Trmn. ab. ***pallida*** Tutt

Anthrocera hippocrepidis Hübn., Tutt *nec* Hübn., ab. *pallida* Tutt, 1899, *Brit. Lep.* **1** : 533.

(Pl. 54, fig. 33)

Type : ♀ 26 mm. " Chattenden. Tutt. Coll. 25.v–24.vi. 92." ; " ab. pallida, Type ".
ex Tutt collection. Slide No. 584.

Zygaena filipendulae L. ssp. ***pyrenes*** Verity

Zygaena filipendulae race *pyrenes* Verity, 1921, *Ent. Rec.* **33** : 122.
Zygaena Dubia-quinquemaculata Oberthür, 1910, *Lép. Comp.* **4** : 539.

[quinquemaculata]

(Pl. 55, fig. 5)

Lectotype : ♂ 36 mm. " Pyr. Orient. Vernet-les-Bains R. Oberthür VII. VIII. 1906 " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII No. 169 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 683.

The name *quinquemaculata* Obthr. is considered a synonym, as Verity stated that the five-spotted form is typical of *pyrenes* Verity.

Zygaena filipendulae L. ssp. ***pyrenes*** Vrty. ab. ***sexmaculata*** Oberthür

Zygaena Dubia-sexmaculata Oberthür, 1910, *Lép. Comp.* **4** : 539.

(Pl. 55, fig. 6)

Type : ♂ 37 mm. " Vernet R. Oberthür " ; " Dubia, forma stoechadis-medicaginis Lépid. comparée. IV 1910." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII No 170 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 684.

Zygaena filipendulae L. ssp. ***ochsenheimeri*** Zeller

Zygaena Ochsenheimeri Zeller, 1847, *Isis von oken.*, p. 303.
Zygaena charon Boisduval, 1834, *Icones*, **2** : 61, pl. 54, fig. 9 (name preoccupied).

[ochsenheimeri]

Zeller applied the name *ochsenheimeri* to specimens that Ochsenheimer had named *transalpina*, as the latter name is preoccupied by *transalpina* Esp. Zeller stated that specimens that he had from Syracuse, Sicily were of the same form. Verity however, has separated the Sicilian race as a good subspecies, viz., ssp. *siciliensis* Vrty. Ochsenheimer gave Italy and Southern France as the locality but this statement covered a large area and included many races. In 1926 Burgeff (*Mitt. münchen. ent. Ges.* **16** : 66) considered the form from Montpellier to agree most of all with Ochsenheimer's description.

[charon]

(Pl. 54, fig. 36)

Type : ♂ 37 mm. " Charon " ; " EX. MUSAEO Dris. BOISDUVAL " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 633.

Zygaena filipendulae L. ssp. ***ochsenheimeri*** Zell. ab. ***translonicerae*** Stauder

Zygaena hybr. f. *translonicerae* Stauder, 1929, *Ent. Z.* **43** : 80.

(Pl. 55, fig. 1)

Type : ♂ 32 mm. " Teriol. m. Seiseralpe 1700 m 7.8. 1928 H. Stauder Costazza " ; " 6813 " ; " hybr. translonicerae Stdr. Type " ; " hybr. ex. lonicerae × transalp. costazzina ".

ex Rothschild collection. Slide No. 700.

An examination of the genitalia, which are quite normal, showed the specimen to be conspecific with *filipendulae* L.

Zygaena filipendulae L. ssp. ***restituta*** Rocci ab. ***achillfilipendulae*** Stauder

Zygaena hybr. f. *achillfilipendulae* Stauder, 1929, *Ent. Z.* **43** : 31.

(Pl. 55, fig. 2)

Type : ♀ 31 mm. " Litorale austr. Görz 3.9. 08. H. Stauder " ; " achilleae × filipendulae=f. hybr. achillfilipendulae Stdr." ; " 6820 ".

ex Rothschild collection. Slide No. 476.

An examination of the genitalia, which are normal, showed the specimen to be conspecific with *filipendulae* L. As the type differs in superficial characters from normal specimens of its race, I place it as an aberration.

Zygaena filipendulae L. ssp. ***veneta*** Rocci

Zygaena filipendulae ssp. *veneta* Rocci, 1937, *Redia*, **22** : 136.
Zygaena hybr. f. *melilofilipendulae* Stauder, 1929, *Ent. Z.* **43** : 31.

[melilofilipendulae]

(Pl. 55, fig. 3)

Type : ♀ 30 mm. " Litorale austr. Triest Umgbg. Cologna el. 15/6 1914 H. Stauder " ; " 6824 " ; " hybr. Type. melilofilipendulae Stdr." ; " hybr. meliloti × filip. ochs.".
ex Rothschild collection. Slide No. 549.

The specimen was erroneously described as a male. The genitalia are quite normal and I treat the name *melilofilipendulae* as a synonym.

Zygaena filipendulae L. ssp. ***duponcheli*** Vrty. ab ***flava*** Oberthür

Zygaena filipendulae ssp. *medicaginis* ab. *flava* Oberthür, 1910, *Lép. Comp.* **4** : 536.

(Pl. 55, fig. 4)

Type : ♂ 34 mm. " Alpes Maritimes Nice (Le Var) V. Cotte Mai 1897 " ; " Ab. flava, Obthr. Lépid. comparée IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 547.

Zygaena filipendulae L. ssp. ***anceps*** Oberthür

Zygaena filipendulae ssp. *anceps* Oberthür, 1910, *Lép. Comp.* **4** : 551.
Zygaena filipendulae var. *quinquemacula* Bethune-Baker, 1922, *Ent. Rec.* **34** : 74.

[anceps]

(Pl. 55, fig. 7)

Lectotype : ♂ 33 mm. " Ste. Baume 24 Juin 1906 Dr. Siepi " ; " anceps Obthr. Lépid. comparée IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 544.

[quinquemacula]

(Pl. 55, fig. 8)

Lectotype : ♀ 31 mm. " la Sainte Baume, Var, Provence, France 2.7. 20. G. T. Bethune-Baker ".
ex Bethune-Baker collection. Slide No. 668.

Zygaena filipendulae L. ssp. ***campaniae*** Rebel

Zygaena Stoechadis var. *campaniae* Rebel, 1901, *in* Staudinger & Rebel's *Cat. Lep.*, p. 384.
Zygaena hybr. f. *melilocampaniae* Stauder, 1929, *Ent. Z.* **43** : 79.
Zygaena hybr. f. *hybridophila* Stauder, 1929, *Ent. Z.* **43** : 133.
Zygaena hybr. f. *calabrochsenheimeri* Stauder, 1929, *Ent. Z.* **43** : 132.
Zygaena hybr. f. *melilochsenheimeri* Stauder, 1929, *Ent. Z.* **43** : 32.

[melilocampaniae]

(Pl. 55, fig. 9)

Type : ♂ 33 mm. " Italia mer. penins. Sorrento Mte. Falto 28.6. 1928 H. Stauder

Collo f. 950 m" ; " 6816" ; " hybr. melilocampaniae Stdr." ; " hybr. meliloti × filip. ochsenh. stoechadis campaniae ".
ex Rothschild collection. Slide No. 635.

The genitalia are normal and the specimen is conspecific with *filipendulae* L. This specimen and the next three types are all considered synonymous with *campaniae* Rebel as they do not differ from it in superficial characters.

Mte. Faito is erroneously spelt " Mte. Falto " on the pin label.

[hybridophila]

(Pl. 55, fig. 10)

Lectotype : ♀ 37 mm. " Italia mer. penins. Sorrento Mte. Falto 28.6. 1928 H. Stauder 950 m." ; " 6802 " ; " hybridophila Stdr.".
ex Rothschild collection. Slide No. 637.

There is a further specimen from the same locality, but labelled " 900 m" ; " 6803 ". Two further specimens are labelled " Teriol m. Castelrotto 950 m. 26.7. 1928. H. Stauder." and " 6804 " ; " 6805 ".

Mte. Faito is erroneously spelt " Mte. Falto " on the pin labels. The genitalia are normal and the specimens are conspecific with *filipendulae* L.

[calabrochsenheimeri]

(Pl. 55, fig. 11)

Type : ♂ 33 mm. " Italia mer. penins. Sorrento Mte. Falto 25/6. 1928 H. Stauder Piano Faito 1000 m." ; " 6801 " ; " hybr. calabroochsenheimeri Stdr. Type " ; " hybr. filip. × transalp. (calabr.)? ".
ex Rothschild collection. Slide No. 699.

Mte. Faito is erroneously spelt " Mte. Falto " on the pin label. The genitalia are normal and the specimen is conspecific with *filipendulae* L.

[melilochsenheimeri]

(Pl. 55, fig. 12)

Type : ♀ 36 mm. " Italia mer. penins. Sorrento Mte. Faito 25.6. 1928 H. Stauder 950 m" ; " 6817 " ; " Zyg. hybr. melilochsenheimeri Stdr. ochsenh. × meliloti giussana Type ".
ex Rothschild collection. Slide No. 634.

The genitalia are normal and the specimen is conspecific with *filipendulae* L. The red abdominal ring mentioned by Stauder in the description is superficial and false.

Zygaena filipendulae L. ssp. ***campaniae*** Rebel ab. ***carnioligiussana*** Stauder

Zygaena hybr. f. *carnioligiussana* Stauder, 1929, *Ent. Z.* **43** : 80.

(Pl. 55, fig. 13)

Type : ♂ 33 mm. " Italia mer. penins. Sorrento Mte. Falto 28.6. 1928 H. Stauder 950 m " ; " 6814 " ; " hybr. carnioligiussana Stdr.".
ex Rothschild collection. Slide No. 701.

The genitalia are normal but I treat the specimen as an aberration as it differs superficially from ssp. *campaniae* Rebel. Mte. Faito is erroneously spelt " Mte. Falto " on the pin label.

Zygaena filipendulae L. ssp. ***campaniae*** Rebel ab. ***dubia*** Staudinger

Zygaena filipendulae ab. *dubia* Staudinger, 1861, *in* Staudinger & Wocke's *Cat. Lep.*, p. 21.
Zygaena hybr. f. *melilodubia* Stauder, 1929, *Ent. Z.* **43** : 80.

[melilodubia]

(Pl. 55, fig. 14)

Type : ♂ 34 mm. " Italia mer. penins. Sorrento Mte. Falto 1.7. 1928. H. Stauder. Piano f. 1000 m " ; " 6818 " ; " hybr. melilodubia Stdr.".
ex Rothschild collection. Slide No. 636.

Mte. Faito is erroneously spelt " Mte. Falto " on the pin label. The genitalia are normal and the specimen is conspecific with *filipendulae* L.

Zygaena filipendulae L. ssp. ***seeboldi*** Oberthür

Zygaena filipendulae ssp. *Seeboldi* Oberthür, 1910, *Lép. Comp.* **4** : 543.

(Pl. 55, fig. 15)

Lectotype : ♂ 36 mm. " Bilbao." ; " Espagne Bilbao T. Seebold " ; " Seeboldi Obthr.." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 550.

Zygaena filipendulae L. ssp. ***ramburii*** H.-S. ab. ***rosa*** Oberthür

Zygaena rosa Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, figs. 106, 107.

(Pl. 55, fig. 16)

Type : ♂ 33 mm. " Syrie. Akbès Ch. Delagrange Eté 1890 " ; " Zygaena rosa, Obthr type ♂ " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXII No. 107 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 548.

A further specimen labelled " type ♀ " is a male.

Zygaena filipendulae L. ssp. ***syriaca*** Oberthür

Zygaena Syriaca Oberthür, 1896, *Et. d'Ent.* **20** : 46.
Zygaena Syriaca (6-*macul.*) Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 137.
Zygaena Syriaca-sexmaculata Oberthür, 1910, *Lép. Comp.* **4** : 564.

(Pl. 55, fig. 18)

Lectotype : ♀ 39 mm. " Syrie. Akbès Ch. Delagrange Eté 1890 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8. No. 137 " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 631.

I take as typical the six-spotted form, to which Oberthür also applied the name *sexmaculata* Obthr.

In addition to the female lectotype, I figure on Pl. 55, fig. 19, a typical male labelled " Syrie. Akbès Ch. Delagrange Eté 1890 " ; " Original zur Abbildung des Z. syriaca ♂ im Seitz, Suppl., Bd. 2, Tafel 3n 1930. H. Reiss." ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 678.

This specimen is 38 mm. in wingspan but appears larger than the female on the plate owing to a slightly higher magnification of the original photograph.

Zygaena filipendulae L. ssp. ***syriaca*** Obthr. ab. ***quinquemaculata*** Oberthür

Zygaena syriaca (*5-macul.*) Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 136.
Zygaena Syriaca-quinquemaculata Oberthür, 1910, *Lép. Comp.* **4** : 564.

(Pl. 55, fig. 20)

Type : ♂ 38 mm. " Syrie. Akbès Ch. Delagrange Eté 1890 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 136 " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 660.

Zygaena filipendulae L. ssp. ***syriaca*** Obthr. ab. ***confluens*** Oberthür

Zygaena syriaca ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 138.
Zygaena Syriaca-sexmaculata-confluens Oberthür, 1910, *Lép. Comp.* **4** : 564.

(Pl. 55, fig. 21)

Type : ♀ 40 mm. " Syrie. Akbès Ch. Delagrange Eté 1890 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 138 " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 632.

Zygaena trifolii Esper

Sphinx trifolii Esper, 1783, *Die Schmett.* **2** : 223, pl. 34, figs. 4, 5.

Zygaena trifolii Esp. ssp. ***palustrella*** Vrty. ab. ***pygmaea*** Cockayne

Zygaena trifolii ab. *pygmaea* Cockayne, 1954, *Ent. Rec.* **66** : 67, pl. 2, fig. 7.

(Pl. 55, fig. 17)

Type : ♂ 20 mm. " Watergate 9 Jn '95 " ; " Type ab. pygmaea Cockayne 1954 ".

ex W. M. Christy collection. Slide No. 569.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **extrema** Tutt

Anthrocera trifolii ab. *extrema* Tutt, 1899, *Brit. Lep.* **1** : 485.

(Pl. 55, fig. 22)

Type : ♂ 30 mm. " Watergate 3 Jn '95 ".
ex W. M. Christy collection. Slide No. 567.

The specimen was figured by Christy in the *Entomologist*, **29** : 341, fig. 2.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **obsoleta** Tutt

Anthrocera trifolii ab. *obsoleta* Tutt, 1899, *Brit. Lep.* **1** : 485.

(Pl. 55, fig. 23)

Type : ♂ 30 mm. " Watergate 26 Ma '96 ".
ex W. M. Christy collection. Slide No. 566.

The specimen was figured by Christy in the *Entomologist*, **29** : 341, fig. 1.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **orichalca** Tutt

Anthrocera trifolii ab. *orichalca* Tutt, 1899, *Brit. Lep.* **1** : 484.

Tutt applied the name *orichalca* to male specimens of *trifolii* which had the ground colour of the fore wings a bright bronzy-green. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **caerulea** Tutt

Anthrocera trifolii ab. *caerulea* Tutt, 1899, *Brit. Lep.* **1** : 484.

In this aberration the ground colour in the males is a distinct bluish-purple. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **lutescens-basalis** Tutt

Anthrocera trifolii ab. *lutescens-basalis* Tutt, 1899, *Brit. Lep.* **1** : 488.

In this aberration spots 1 and 2 are joined to 3 and 4, while 5 is separate. The normal red colour is replaced by yellow. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. **palustrella** Vrty. ab. **lutescens-confluens** Tutt

Anthrocera trifolii ab. *lutescens-confluens* Tutt, 1899, *Brit. Lep.* **1** : 488.

This aberration has all the spots confluent while the normal red colour is replaced by yellow. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. ***palustrella*** Vrty. ab. ***lutescens-glycirrhizae*** Tutt

Anthrocera trifolii ab. *lutescens-glycirrhizae* Tutt, 1899, *Brit. Lep.* **1** : 488.

This aberration has the spots as in ab. *glycirrhizae* Hübn. while the red is replaced by yellow. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. ***palustrella*** Vrty. ab. ***intermedia*** Tutt

Anthrocera trifolii ab. *intermedia* Tutt, 1899, *Brit. Lep.* **1** : 487.

In this aberration the red is replaced by dull orange tinged with red. The type is not in the British Museum.

Zygaena trifolii Esp. ssp. ***decreta*** Verity

Zygaena trifolii race *decreta* Verity, 1926, *Ent. Rec.* **38** : 57.
Zygaena trifolii-major Tutt, 1897, *Ent. Rec.* **9** : 88 (preoccupied).

[trifolii-major]

(Pl. 55, fig. 24)

Lectotype : ♀ 32 mm. " Ham Ponds, Surrey. ✻ vii 91 ex coll. Tutt.".
ex Rothschild collection. Slide No. 651.

Zygaena trifolii Esp. ssp. ***decreta*** Vrty. ab. ***carnea*** Cockayne

Zygaena trifolii ab. *carnea* Cockayne, 1942, *Ent. Rec.* **54** : 35.

(Pl. 55, fig. 25)

Type : ♂ 31 mm. " Bagley Oxfd 27.vi. 04. ✻ " ; " E. A. Cockayne 27. VI. 1904 Bagley Wood Oxford ✻ " ; " Type ab. carnea Ckyne. Ent. Rec. 1942. 54.35 ".
ex Cockayne collection. Slide No. 568.

Zygaena trifolii Esp. ssp. ***decreta*** Vrty. ab. ***obscura*** Tutt

Anthrocera trifolii ab. *obscura* Tutt, 1899, *Brit. Lep.* **1** : 487.

(Pl. 55, fig. 26)

Type : ♂ 33 mm. " Angleterre Coll. Battershell Gill Vendue Salle Stevens 12, 13 Avril 1886." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII no 164 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 570.

Zygaena trifolii Esp. ssp. ***palustris*** Oberthür

Zygaena trifolii-palustris (Bdv.) Oberthür, 1896, *Et. d'Ent.* **20** : 45.

(Pl. 55, fig. 27)

Lectotype : ♀ 36 mm. " Env. de Rennes Printemps 1894 " ; " trifolii palustris " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 160.

The lectotype was selected in 1958 (*Ent. Gaz.* **9** (4) : 185). Since this publication, I have found the specimen in the Boisduval collection labelled " Palustris ", which Oberthür mentioned in his description. I figure this specimen on Pl. 56, fig. 1. Slide No. 735. According to Oberthür the specimen originated from Brittany.

Zygaena trifolii Esp. ssp. ***palustris*** Obthr. ab. ***nigricans*** Oberthür

Zygaena trifolii-palustris ab. *nigricans* Oberthür, 1907, *Bull. Soc. ent. Fr.*, p. 220.

(Pl. 56, fig. 5)

Type : ♂ 33 mm. " Env. de Rennes 18–24 Juin 1907 " ; " Ab. nigricans, Obthr. Bull. Soc. ent. France 1907, p. 220." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 638.

Zygaena trifolii Esp. ssp. ***palustris*** Obthr. ab. ***sexmaculata*** Oberthür

Zygaena Trifolii-Palustris (Bdv.) (6-*macul.*) Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 151.
Zygaena Palustris sexmaculata Oberthür, 1910, *Lép. Comp.* **4** : 500.

(Pl. 56, fig. 2)

Type : ♂ 33 mm. " Env. de Rennes Printemps 1894 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 151 ". " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 639.

Zygaena trifolii Esp. ssp. ***palustris*** Obthr. ab. ***confluens*** Oberthür

Zygaena Trifolii-Palustris (Bdv.) ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 153.

(Pl. 56, fig. 3)

Type : ♀ 37 mm. " Env. de Rennes Printemps 1894 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 153 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 641.

Zygaena trifolii Esp. ssp. ***palustris*** Obthr. ab. ***confluens-sexmaculata*** Oberthür

Zygaena Trifolii-Palustris (Bdv.) ab. *confluens* (6-*Macul.*) Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 152.
Zygaena Palustris sexmaculata Oberthür, 1910, *Lép. Comp.* **4** : 500.

(Pl. 56, fig. 4)

Type : ♂ 33 mm. " Env. de Rennes Printemps 1893 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No 152 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 640.

Zygaena trifolii Esp. ssp. ***olbiana*** Oberthür

Zygaena Olbiana Oberthür, 1910, *Lép. Comp.* **4** : 496.

(Pl. 56, fig. 6)

Type : ♂ 31 mm. " Hyères (Var) Le Ceinturon 21-V-1906 Rd Powell." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII No 168 " ; " Olbiana, Obthr. forme de trifolii, Lépidopt. comparée IV. 1910 ♂." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 647.

Zygaena trifolii Esp. ssp. ***duponcheliana*** Oberthür

Zygaena Duponcheliana Oberthür, 1910, *Lép. Comp.* **4** : 495.

(Pl. 56, fig. 7)

Type : ♂ 31 mm. " Pyrénées Orientales Vernet-les-Bains R. Oberthür Eté 1891 " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 150 " ; " forma : Duponcheliana, Obthr. Lépid. comparée IV–1910." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 646.

Zygaena trifolii Esp. ssp. ***syracusia*** Zeller

Zygaena Syracusia Zeller, 1847, *Isis von oken.*, p. 301.
Zygaena syracusiae auctorum.

(Pl. 56, fig. 8)

Lectotype : ♂ 30 mm. " Syracuz excl. 17/5 44.".
ex Zeller collection. Slide No. 648.

The correct spelling is *syracusia*, not *syracusiae*, which has been used by various authors in the past.

Zygaena trifolii Esp. ssp. ***trinacria*** Verity

Zygaena lonicerae race *trinacria* Verity, 1917, *Bull. Soc. ent. Fr.*, p. 224.
Zygaena trifolii ssp. *trinacria* Verity, 1926, *Ent. Rec.* **38** : 11.

(Pl. 56, fig. 9)

Lectotype : ♂ 34 mm. " Sicilia Lupo 5 Kr. E. Ragusa " ; " 31 " ; " Sicily, Coll. E. Ragusa." ; " race trinacria Vrty. spec. typicum.".
ex Rothschild collection. Slide No. 669.

Zygaena trifolii Esp. ssp. ***trinacria*** Vrty. ab. ***krügeri*** Ragusa

Anthocere [*sic*] *Trifolii syracusia* var. *Krügeri* Ragusa, 1924, *Boll. Lab. Zool. Portici.* **18** : 88.

(Pl. 56, fig. 10)

Lectotype : ♀ 36 mm. " Sicilia Lupo. 6 Kr. E. Ragusa " ; " 26 " ; " Sicily, coll. E. Ragusa.".
ex Rothschild collection. Slide No. 670.

Zygaena trifolii Esp. ssp. ***caerulescens*** Reiss

Zygaena trifolii ssp. *caerulescens* Reiss, 1936, *Ent. Rdsch.* **54** : 90, pl. 2, figs.
Zygaena australis var. *caerulescens* Oberthür, 1910, *Lép. Comp.* **4** : 493 (ab. *caerulescens* Obthr. name invalid).

(Pl. 56, fig. 11)

Lectotype : ♂ 28 mm. " Sierra de Alfakar R. Obr. & L. Bl. Juillet 1879 " ; " Ab. caerulescens Obthr. Lépid. comparée. IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 645.

Although Oberthür used the term " var ", the text implies that he was referring to an aberration. However, the form has since proved to be a good subspecies and apparently it is Reiss who first quoted *caerulescens* as a subspecies. According to the rules of nomenclature Reiss is the correct author of the subspecific name *caerulescens*.

Zygaena trifolii Esp. ssp. ***barcelonensis*** Reiss f.t. ***intricata*** Sagarra ab. ***depravata*** Sagarra

Zygaena trifolii f. *depravata* Sagarra, 1925, *Butll. Inst. catal. Hist. nat.* (2) **5** : 273.
Zygaena clorinda Bethune-Baker, 1926, *Ent. Rec.* **38** : 84.

[clorinda]

(Pl. 56, fig. 17)

Holotype : ♂ 24 mm. " CATALONIA Llobregat 2 m. 4.10. 25. Querci " ; " 290 ", on the reverse side of the data label is written " Zygaena quercii B-B. Type ♂ ".
ex Bethune-Baker collection. Slide No. 650.

The holotype and allotype are labelled " Zygaena quercii ", but the valid name is *clorinda*, which is however, synonymous with *depravata* Sagarra.

Zygaena trifolii Esp. ssp. ***australis*** Oberthür

Zygaena Australis (Lederer) Oberthür, 1910, *Lép. Comp.* **4** : 491.

(Pl. 56, fig. 12)

Lectotype : ♂ 28 mm. " Algérie Lambèze L. Bleuse Juin 1885 " ; " australis, sec. Obthr. Lépid. compar. IV–1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 644.

Zygaena trifolii Esp. ssp. ***australis*** Obthr. ab. ***aurorina*** Oberthür

Zygaena australis ab. *aurorina* Oberthür, 1910, *Lép. Comp.* **4** : 493.

(Pl. 56, fig. 13)

Lectotype : ♂ 31 mm. " Algérie Lambèse J. Merkl. Juin 1884 " ; " aurorina Obthr. Lépid. compar. IV–1910." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 642.

Zygaena trifolii Esp. ssp. **australis** Obthr. ab. **ruficostata** Holl

Zygaena trifolii australis ab. *ruficostata* Holl, 1912, *Bull. Soc. Hist. nat. Afr. N.* **4** (6) : 117.

(Pl. 56, fig. 14)

Type : ♂ 24 mm. " H. Dey 18.6. 10 " ; " Type décrit Bul. S.H.N. de l'Afr. du Nord No. 6. 15.6. 12 page 117 " ; " Collection Capt. HOLL.".
ex Rothschild collection. Slide No. 674.

Zygaena trifolii Esp. ssp. **seriziati** Oberthür

Zygaena Seriziati Oberthür, 1876, *Et. d'Ent.* **1** : 33.

(Pl. 56, fig. 15)

Type : ♂ 29 mm. " Collo " ; " Zygaena Seriziati, Oberthür Etud. d'Entomol. IIIe liv'on, pl. V, fig. 7. page 41) " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 643.

Zygaena trifolii Esp. ssp. **diffusemarginata** Rothschild

Zygaena trifolii diffusemarginata Rothschild, 1933, *Novit. zool.* **38** : 324.

(Pl. 56, fig. 16)

Type : ♂ 32 mm. " Hauta Kasdir Marruecos m. 1750 Ferrer 15–7–32 " ; " 310 " ; " Zygaena trifolii diffusomarginata Rothsch. Type ".
ex Rothschild collection. Slide No. 649.

The published name is *diffusemarginata*, and is the valid name although " diffusomarginata " is written on the pin label.

Zygaena lonicerae Scheven

Sphinx lonicerae Scheven, 1777, *Naturf.* **10** : 97.

Zygaena lonicerae Schev. ab. **asymetrica** Oberthür

Zygaena Lonicerae ab. *asymetrica* Oberthür, 1911, *Lép. Comp.* **5** (1) : 197, pl. 63, fig. 587.

(Pl. 56, fig. 18)

Type : ♀ 35 mm. " abb. de Lonicerae " ; " ex. coll. Reynald de Lyon " ; " Zygaena Lonicerae ♀ Lépid. comparée. Vol. V-No. 587." ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 661.

Zygaena lonicerae Schev. ab. **citrina** Speyer

Zygaena lonicerae ab. *citrina* Speyer, 1887, *Stettin. ent. Ztg.* **48** : 334.
Zygaena Lonicerae ab. *flava* Oberthür, 1896, *Et. d'Ent.* **20** : 43, pl. 8, fig. 148.

[flava]

(Pl. 56, fig. 19)

Type : ♀ 39 mm. " Cevennes." ; "Ex. Coll. Bellier " ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 148 " ; " coll. Ch. Oberthür.". ex Rothschild collection. Slide No. 654.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **cuneata** Tutt

Anthrocera lonicerae ab. *cuneata* Tutt, 1899, *Brit. Lep.* **1** : 468.

(Pl. 56, fig. 20)

Type : ♂ 30 mm. " Chattenden 24.vi. 93 " ; " Tutt Coll." ; " type cuneata ". ex Tutt collection. Slide No. 573.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **miniata** Tutt

Anthrocera lonicerae ab. *miniata* Tutt, 1899, *Brit. Lep.* **1** : 467.

(Pl. 57, fig. 31)

Type : ♂ 26 mm. " Tutt Coll. Chattenden, 30.v. 94 " ; " type miniata ". ex Tutt collection. Slide No. 574.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **centripuncta** Tutt

Anthrocera lonicerae ab. *centripuncta* Tutt, 1899, *Brit. Lep.* **1** : 468.

(Pl. 56, fig. 21)

Lectotype : ♀ 34 mm. " centripuncta Chattenden vii. 92 " ; " Tutt coll.". ex Tutt collection. Slide No. 572.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **minor** Tutt

Anthrocera lonicerae ab. *minor* Tutt, 1899, *Brit. Lep.* **1** : 467.

(Pl. 56, fig. 22)

Type : ♂ 24 mm. " Tutt Coll. Chattenden. 30.v. 94 " ; " type minor ". ex Tutt collection. Slide No. 571.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **trivittata** Tutt

Anthrocera lonicerae ab. *trivittata* Tutt, 1899, *Brit. Lep.* **1** : 468.

This aberration has the spots of the fore wings joined into three longitudinal streaks as follows : 1, 2 + 4, 3 + 5. The type is not in the British Museum.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **eboracae** Prest

Zygaena eboracae Prest, 1883, *Entomologist*, **16** : 274.

(Pl. 56, fig. 23)

Lectotype : ♂ 30 mm. " Z. ' Eboracae ' Prests Sale 1884." ; " Var Eboracae W. Prest " ; " Angleterre ex. Coll. Howard Vaughan vendue Salle Stevens 22 & 23 Avril 1890 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 680.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. ab. **grisescens** Cockayne

Zygaena lonicerae ab. *grisescens* Cockayne, 1954, *Ent. Rec.* **66** : 67.

(Pl. 56, fig. 24)

Type : ♂ 32 mm. " coll. Gregson " ; " S. Webb coll Barrett pl. 59. 3c." ; " Type ab. grisescens Cockayne 1954 ".
ex R. Adkin collection. Slide No. 575.

This specimen is figured by Barrett, *Lepidoptera of the British Isles*, **2**, pl. 59, fig. 3c.

Zygaena lonicerae Schev. ssp. **transferens** Vrty. f. loc. **latomarginata** Tutt

Anthrocera lonicerae var. *latomarginata* Tutt, 1899, *Brit. Lep.* **1** : 468.

(Pl. 56, fig. 25)

Lectotype : ♂ 35 mm. " Filey, Yorkshire. vii. 1892 ex coll. Tutt."
ex Rothschild collection. Slide No. 663.

Zygaena lonicerae Schev. ssp. **insularis** Tremewan

Zygaena lonicerae ssp. *insularis* Tremewan, 1960, *Ent. Gaz.* **11** (4) : 191.

(Pl. 56, fig. 26)

Holotype : ♀ 36 mm. " Armagh, vii. 1890 ex coll. Tutt." ; " Z. lonicerae ssp. insularis Tremewan. Holotype ♀ det. W. G. Tremewan, 1959.".
ex Rothschild collection. Slide No. 679.

The specimen was taken at Mullinures, Co. Armagh, according to Tutt, *vide Brit. Lep.* **1** : 468.

Zygaena lonicerae Schev. ssp. **major** Frey

Zygaena Lonicerae var. *Major* Frey, 1880, *Lep. Schweiz*, p. 67.

(Pl. 56, fig. 27)

Lectotype : ♀ 41 mm. " Z. Lonicerae Var. Major. Frey. St. Nicolas.".
ex Frey collection. Slide No. 652.

Zygaena lonicerae Schev. ssp. ***major*** Frey ab. ***confluens*** Oberthür

Zygaena Dubia ab. *confluens* Oberthür, 1896, *Et. d'Ent.* **20**, pl. 8, fig. 147.
Zygaena Lonicerae ab. *confluens* Oberthür, 1911, *Lép. Comp.* **5** (1) : 197, pl. 63, fig. 586.

[confluens Oberthür, 1896]

(Pl. 57, fig. 2)

Type : ♂ 37 mm. " Vernet-l-Bains R. Oberthür Juillet 1885. ; " Lépidoptère figuré dans la XXe livraison des Etudes d'Entomol. Pl. 8 No. 147 " ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 346.

An examination of the genitalia showed the specimen to be an aberration of *lonicerae* Scheven.

[confluens Oberthür, 1911]

(Pl. 57, fig. 3)

Type : ♀ 39 mm. " Vernet-l-Bains R. Oberthür Juillet 1885." ; " Zygaena Lonicerae ♀ Lépid. comparée Vol. V. No. 586." ; " coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 662.

Zygaena lonicerae Schev. ssp. ***major*** Frey ab. ***incendium*** Oberthür

Zygaena lonicerae-incendium Oberthür, 1909, *Lép. Comp.* **3**, pl. 22, fig. 105.

(Pl. 57, fig. 1)

Type : ♂ 40 mm. " Valais, Plan Cerisier près Martigny. 1907 Juin—A. Wullschlegel." ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909. Pl. XXII fig. 105" ; "coll. Ch. Oberthür.".

ex Rothschild collection. Slide No. 653.

Zygaena lonicerae Schev. ssp. ***major*** Frey ab. ***nigerrima*** Curtis

Zygaena trifolii ab. *nigerrima* Curtis, 1934, *Ent. Rec.* **46** : 37, pl. 1, fig. 3.

(Pl. 57, fig. 4)

Type : ♀ 36 mm. " Maurin pres Barcelonette. Basses Alpes, France 1/10 : viii : 1932 W. P. Curtis " ; " 23587 ZYGAENA trifolii Esp. ab nigerrima Curtis detd by W. P. Curtis 23 : ix : 1933 ".

ex Curtis collection.

The abdomen of this specimen is unfortunately missing, but I am confident that this is an aberration of *lonicerae* Scheven. It has been suggested that it is a *transalpina* Esp. (*vide Ent. Rec.* **46** : 37), but the position of the spots on the fore wings eliminates this species. H. Reiss has also determined the specimen as an aberration of *lonicerae* Scheven.

Zygaena lonicerae Schev. ssp ***major*** Frey ab. ***semidiaphana*** Stauder

Zygaena lonicerae major f. *semidiaphana* Stauder, 1929, *Ent. Z.* **43** : 80.

(Pl. 57, fig. 5)

Type : ♀ 33 mm. " Teriol. mer. Castelrotto 900 m. 22.7. 1928 H. Stauder " ; " 6812 " ; " lonicerae f.n. semidiaphana Stdr.".
ex Rothschild collection. Slide No. 682.

Zygaena lonicerae Schev. ssp. ***kindermanni*** Oberthür

Zygaena lonicerae Kindermanni Oberthür, 1910, *Lép. Comp.* **4** : 544 (*partim*).

(Pl. 57, fig. 6)

Lectotype : ♂ 32 mm. " stochadis Kindermann " ; " stoechadis-Kindermanni, Obthr. Lépid. comparee IV–1910 " ; " EX Coll. DE GRASLIN " ; coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 553.

There are eight specimens in the Oberthür collection. Two of these specimens are from the de Graslin collection and are labelled " stochadis Kindermann ". Two specimens are from the Guenée collection ; one labelled " Russie ", the second labelled " Russie? ". Four specimens are from the Boisduval collection and are without data. I have selected as the lectotype a specimen from the de Graslin collection which, according to the label, was collected by Kindermann.

Further there are nineteen specimens in the Oberthür collection which had been referred to *kindermanni* by Oberthür. They are not a subspecies of *lonicerae* but *filipendulae* L. from Spain and have been described by Burgeff under the name of *himmighofeni*. Four specimens are from the de Graslin collection, two of these are labelled " stoechadis oct. barcelonne Stgr." ; the third specimen is labelled " Staudin. Stoechadis. Catalogne " while the fourth specimen is labelled " Beck. janvier 55 ". Six specimens are from the Guenée collection of which two are labelled " Barcelon ", two " Andales ", one labelled " Catalogne " while the sixth specimen has no data. A specimen from the Boisduval collection is also without data. Of the eight remaining specimens, seven are from the Bellier collection ; four are labelled " Espagne, Barcelone " and three are without data. Finally a specimen labelled " Espagne " has no indication of the collector or the collection from which it originated.

Oberthür stated that *kindermanni* from the Caucasus is the same form as that collected by Himmighoffen from Catalonia. In addition to the lectotype I figure a specimen from Catalonia which was labelled *kindermanni* by Oberthür and which is in fact a subspecies of *filipendulae* L., Pl. 57, fig. 7.

The data of the specimen is as follows : " Staudin. stoechadis. Catalogne " ; " 303 " ; " ex. Coll. DE GRASLIN " ; Stoechadis-Kindermanni Obthr. Lépid. compar. IV. 1910 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 655.

ADDENDUM

Subg. ***MESEMBRYNUS*** Hübner

Zygaena speciosa Reiss

Zygaena speciosa Reiss, 1937, *Ent. Rdsch.* **54** : 466.

Zygaena speciosa Reiss ssp. ***suleimanicola*** Reiss

Zygaena speciosa var. *suleimanicola* Reiss, 1937, *Mitt. münchen. ent. Ges.* **27** : 165.

(Pl. 57, fig. 11)

Cotype : ♀ 31 mm. " Persia sept. Elburs mts. c.s. Tacht i Suleiman. Särdab Tal (Hećerćam) 4200 m. 20.7. 37 E. Pfeiffer & W. Forster München leg." ; " Cotype ♀ suleimanicola Reiss 1937. H. Reiss ".
Slide No. 739.

Zygaena corsica Boisduval

Zygaena corsica Boisduval, 1829, *Mon. Zyg.*, p. 81, pl. 5, fig. 2.

Zygaena corsica Boisd. ssp. ***sardiniensis*** Holik

Zygaena corsica ssp. *sardiniensis* Holik, 1936, *Lambillionea*, **36** : 226.

(Pl. 57, fig. 9)

Cotype : ♂ 25 mm. " Aritzo Sardinia 900 m. 23.6. 35 Dr. H. Bytinski-Salz " ; " Cotypus ".
Slide No. 726.

There are four cotypes in the British Museum.

Zygaena corycia Staudinger

Zygaena Brizae Esp. v. *Corycia* Staudinger, 1878, *Horae Soc. ent. Ross.* **14** : 318.

Zygaena corycia Stdgr. ssp. ***staudingeriana*** Reiss

Zygaena corycia var. *staudingeriana* Reiss, 1932, *Int. ent. Z.* **26** : 270.

(Pl. 57, fig. 10)

Cotype : ♂ 25 mm. " Becharre Libanon Juni 31. Kulzer." ; " CO-TYPE VON Z. CORYCIA SSP. STAUDINGERIANA REISS ".
Slide No. 283.

Zygaena alpherakyi Sheljuzhko

Zygaena Alpherakyi (Chr.i.l.) *Sheljuzhko*, 1936, *Folia zool. hydrobiol.* **9** : 17.

Zygaena alpherakyi Shelj. ssp. **ossetica** Holik

Zygaena alpherakyi ssp. *ossetica* Holik, 1939, *Ann. mus. zool. Polon.* **13** : 248.

(Pl. 57, fig. 12)

Cotype : ♂ 33 mm. " Karaugom 1800, 17. VII leg. R. Wojtusiak " ; " Polska Wyprawa na Kaukaz VII–VIII. 1935 " ; " Z. alpherakyi ssp. ossetica Holik. COTYPE ".
Slide No. 729.
There are two cotypes in the British Museum.

Zygaena diaphana Staudinger

Zygaena pilosellae var. *diaphana* Staudinger, 1887, *Berl. ent. Z.* **31** : 31.

(Pl. 57, fig. 13)

Paralectotype : ♂ 29 mm. " Hadjin v. diaphana " ; " 18/5 " ; " Origin." ; " ex collect. Staudinger." ; " Z. purpuralis diaphana Stgr. det. O.Holik ".
ex Zoologisches Museum, Berlin. Slide No. 192.
A lectotype was selected in 1958 and is now in the Zoologisches Museum, Berlin (*vide Ent. Gaz.* **9** (4) : 183, 1958).

Zygaena diaphana Stdgr. ssp. ***sareptensis*** Rebel

Zygaena purpuralis var. *sareptensis* Rebel, 1901, *in* Staudinger & Rebel's *Cat. Lep.*, p. 380.

(Pl. 57, fig. 14)

Paralectotype : ♀ 36 mm. " Sarepta 90. Wick " ; " ex collect. Staudinger " ; " Z. purpuralis sareptensis Stgr. det. O. Holik ".
ex Zoologisches Museum, Berlin. Slide No. 193.
A lectotype was selected in 1958 and is now in the Zoologisches Museum, Berlin (*vide Ent. Gaz.* **9** (4) : 183, 1958).

Subg. ***AGRUMENIA*** Hübner

Zygaena johannae Le Cerf

Zygaena Johannae Le Cerf, 1923, *Bull. Soc. ent. Fr.*, p. **224**.

Zygaena johannae Le Cerf ssp. ***turbeti*** Le Cerf

Zygaena johannae ssp. *turbeti* Le Cerf, 1929, *Bull. Soc. ent. Fr.*, p. 263.

(Pl. 57, fig. 15)

Cotype : ♂ 22 mm. " MAROC Moyen Atlas " ; " ich bou Naçeur 1 er.–VII–1929. 3,300–3,400 m. F. Le Cerf " ; " COTYPE " ; " Zyg. johannae-turbeti Le Cf. ♂ Cotype F. Le Cerf det.".
Slide No. 740.
There are three cotypes in the British Museum.

Zygaena cocandica Erschoff

Zygaena cocandica Erschoff, 1874, *in* Fedtshenko, *Lep. Turkestan*, p. 28, pl. 2, fig. 22.

Zygaena cocandica Ersch. ssp. ***banghaasi*** Burgeff

Zygaena cocandica banghaasi Burgeff, 1927, *Horae Macrolep.* **1** : 56, pl. 9, figs. 18, 19.

(Pl. 57, fig. 16)

Cotype : ♂ 27 mm. " Dombratschi Buchara merid. 28 juli 2000 m." ; " Co-Type e Collection Bang-Haas " ; " 690 ".
ex Rothschild collection. Slide No. 737.

There are six cotypes in the British Museum.

Zygaena mangeri Burgeff

Zygaena mangeri Burgeff, 1927, *Horae Macrolep.* **1** : 55, pl. 9, fig. 17.

(Pl. 57, fig. 17)

Cotype : ♀ 27 mm. " Paghman Gbg. Kabul Afghanistan 1926 " ; " 115 " ; " Co-Type e Collection Bang-Haas " ; " mangeri ".
ex Rothschild collection. Slide No. 657.

Zygaena escalerai Poujade

Zygaena Escalerai Poujade, 1900, *Bull. Mus. Hist. nat. Paris*, **6** (2) : 68.

(Pl. 57, fig. 18)

Paratype : ♂ 22 mm. " Haut-Kharoum, Chindáar (Vallée) Escalera VI–VII 1899 " ; " Z. Escalerai Pouj. (Type) " ; " A servi de Modèle à J. Culot de Genève, pour la IIIe livraison de Lépidoptérologie comparée 1908–1909 Pl. XXVIII No. 172 " ; " coll. Ch. Oberthür.".
ex Rothschild collection. Slide No. 520.

The type of *escalerai* Pouj. is in the Muséum National d'Histoire Naturelle, Paris. The above indicated specimen is labelled " type " but should be considered a paratype.

Zygaena olivieri Boisduval

Zygaena olivieri Boisduval, 1829, *Mon. Zyg.*, p. 98, pl. 6, fig. 4.

Zygaena olivieri Boisd. ssp. ***libanicola*** Burgeff

Zygaena olivieri libanicola Burgeff, 1927, *Horae Macrolep.* **1** : 55.

(Pl. 57, fig. 19)

Cotype : ♂ 27 mm. " Libanon or. Zahlé " ; " Co-Type e Collection Bang-Haas " ; " 116 ".
ex Rothschild collection. Slide No. 738.

There are two cotypes in the British Museum.

Zygaena sogdiana Erschoff

Zygaena sogdiana Erschoff, 1874, *in* Fedtshenko, *Lep. Turkestan*, p. 27, pl. 2, fig. 20.

Zygaena sogdiana Ersch. ssp. ***tshimganica*** Holik

Zygaena sogdiana ssp. *tshimganica* Holik, 1936, *Ent. Rdsch.* **53** : 5.

(Pl. 57, fig. 20)

Cotype : ♂ 29 mm. " Tian-Shan oc. Tshimgan 1500–1600 m. alt. 30.vi. 1934 L. Sheljuzhko leg " ; " 482 " ; " Co-Type e Collection Bang-Haas ".
ex Rothschild collection. Slide No. 742.

There are two cotypes in the British Museum.

Zygaena formosa Herrich-Schäffer

Zygaena Formosa Herrich-Schäffer, 1851, *Schmett. Europa*, **2**, pl. 14, fig. 99.
Zygaena Formosa Herrich-Schäffer, 1854, *Schmett. Europa*, **6** : 45.

Zygaena formosa H.-S. ssp. ***kotzschi*** Reiss

Zygaena kotzschi Reiss, 1935, *Int. ent. Z.* **28** : 489.

(Pl. 57, fig. 21)

Cotype : ♂ 25 mm. " Armenien Khashkhash-Dagh Geröll-Südabhang. 3200 m. 1.-10. 7. leg. Kotzsch " ; " Cotype ♂ Kotzschi Reiss 1935. H. Reiss ".
Slide No. 741.

There are two cotypes in the British Museum.

Zygaena carniolica Scopoli

Sphinx carniolica Scopoli, 1763, *Ent. Carniol.*, p. 189.

Zygaena carniolica Scop. ssp. ***syrmica*** Holik

Zygaena carniolica var. *syrmica* Holik, 1939, *Mitt. münchen. ent. Ges.* **29** : 183.

(Pl. 57, fig. 23)

Cotype : ♀ 29 mm. " Slavonia Fruska Gora 28.6.–12.7. 35. No 6462 W. Forster München." ; " Z. carniolica v. syrmica Holik COTYPE.".
Slide No. 732.

Zygaena carniolica Scop. ssp. ***parisiensis*** Holik

Zygaena carniolica ssp. *modesta* var. *parisiensis* Holik, 1938, *Lambillionea*, **38** : 159.

(Pl. 57, fig. 22)

Paratype : ♂ 28 mm. " LARDY (S. & O.) 14.7.36 Coll. Le Charles " ; " MUSEUM PARIS 1958 coll. L. Le Charles " ; " PARATYPE " ; " COTYPE ".
Slide No. 733.

There are two paratypes in the British Museum.

Zygaena loti Schiffermüller & Denis

Sphinx loti Schiffermüller & Denis, 1775, *Wien. Verz.*, p. 45.

Zygaena loti S. & D. ssp. ***karatshaica*** Sheljuzhko

Zygaena achilleae ssp. *karatshaica* Sheljuzhko, 1936, *Folia. zool. hydrobiol.* **9** : 19.

(Pl. 57, fig. 24)

Cotype : ♂ 32 mm. " Teberda (Cauc. S.) 26. VII 1933. L. Sheljuzhko leg. coll. L. Sheljuzhko " ; " Co-Type e Collection Bang-Haas.".
ex Rothschild collection. Slide No. 728.

There are nine cotypes in the British Museum.

Subg. ***ZYGAENA*** Fabricius

Zygaena erebus Staudinger

Zygaena erebus Staudinger, 1867, *Stettin. ent. Ztg.* **28** : 101.

Zygaena erebus Stdgr. ssp. ***chaos*** Burgeff

Zygaena chaos Burgeff, 1926, *Mitt. münchen. ent. Ges.* **16** : 15.

(Pl. 57, fig. 25)

Cotype : ♂ 28 mm. " Z. chaos Bgff. cot. Bethania (Georg) leg. Tkatschukoff." ; " 118 " ; " Co-Type e Collection Bang-Haas ".
ex Rothschild collection. Slide No. 743.

Zygaena nevadensis Rambur

Zygaena nevadensis Rambur, 1858, *Cat. Syst. Andal.*, p. 166, pl. 1, fig. 10.

Zygaena nevadensis Ramb. ssp. ***schmidti*** Reiss

Zygaena scabiosae ssp. *schmidti* Reiss, 1931, *Int. ent. Z.* **26** : 112.

(Pl. 57, fig. 26)

Cotype : ♂ 27 mm. " Arenas S. Pedro Prov. Avila vi. 1927 A. SCHMIDT." ; " Cotype ♂ schmidti Reiss 1931. H. Reiss ".
ex Rothschild collection. Slide No. 727.

Zygaena filipendulae Linnaeus

Sphinx filipendulae Linnaeus, 1758, *Syst. Nat.*, ed. X, p. 494 (with reference to *Fauna Suecica*, p. 256, 1746).

Zygaena filipendulae L. ssp. ***calxensis*** Le Charles

Zygaena filipendulae calxensis Le Charles, 1949, *Rév. franç. Lépid.* **12** : 179.

(Pl. 57, fig. 27)

Paratype : ♂ 33 mm. " Env. de PEYRELEAU Aveyron 14–17 vii 36 L. Le Charles " ; " MUSEUM PARIS 1958 coll. L. Le Charles " ; " PARATYPE ".
Slide No. 734.

There are two paratypes in the British Museum.

Zygaena filipendulae L. ssp. ***ciscaucasica*** Sheljuzhko

Zygaena filipendulae ssp. *ciscaucasica* Sheljuzhko, 1936, *Folia zool. hydrobiol.* **9** : 20.

(Pl. 57, fig. 28)

Cotype : ♂ 32 mm. " Teberda (Cauc. S.) 23. VII 1933. L. Sheljuzhko leg. Coll. L. Sheljuzhko " ; " Co-Type e Collection Bang-Haas ".
ex Rothschild collection. Slide No. 730.

There are nine cotypes in the British Museum.

Zygaena filipendulae L. ssp. ***wojtusiaki*** Holik

Zygaena filipendulae ssp. *wojtusiaki* Holik, 1939, *Ann. mus. zool. Polon.* **13** : 254.

(Pl. 57, fig. 29)

Cotype : ♀ 34 mm. " Karaugom 1800—20. VII leg. R. Wojtusiak " ; " Polska Wyprawa na Kaukaz VII–VIII. 1935 " ; " Z. filipend. ssp. wojtusiaki Holik COTYPE ".
Slide No. 731.

Zygaena lonicerae Scheven

Sphinx lonicerae Scheven, 1777, *Naturf.* **10** : 97.

Zygaena lonicerae Schev. ssp. ***deludens*** Koch

Zygaena lonicerae ssp. *deludens* Koch, 1944, *Mitt. münchen. ent. Ges.* **34** : 72.

(Pl. 57, fig. 30)

Paratype : ♀ 35 mm. " Bav. mer. Eisenburg Memmingen M.41. No. W. Forster. München " ; " PARATYPE Zygaena lonicerae deludens Koch ".

The genitalia of this specimen are missing.

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PLATE 50

Fig. 1. *Zygaena cuvieri* Boisd., type ♂.

Fig. 2. *Z. cuvieri* Boisd. ab. *confluens* Obthr., type ♂.

Fig. 3. *Z. rubicundus* Hübn. ab. *pseudofaitensis* Stdr., lectotype ♂.

Fig. 4. *Z. corsica* Boisd., lectotype ♂.

Fig. 5. *Z. aurata* Blach. ssp. *blachieri* Roths., type ♂.

Fig. 6. *Z. loyselis* Obthr., lectotype ♂.

Fig. 7. *Z. loyselis* Obthr. ssp. *occidentis* Bgff. (*Z. loyselis* var. *occidentalis* Obthr., lectotype ♂).

Fig. 8. *Z. rubricollis* Hamps., type ♀.

Fig. 9. *Z. loyselis* Obthr. ssp. *fracticingulata* Roths., type ♀.

Fig. 10. *Z. loyselis* Obthr. ssp. *olivacea* Roths., type ♀.

Fig. 11. *Z. loyselis* Obthr. ssp. *montana* Roths. (*Z. ungemachi montana* Roths., type ♂).

Fig. 12. *Z. favonia* Frr. ab. *flava* Roths., type ♂.

Fig. 13. *Z. favonia* Frr. ssp. *vitrina* Stdgr. ab. *powelli* Obthr., type ♀.

Fig. 14. *Z. favonia* Frr. ssp. *borreyi* Obthr., lectotype ♀.

Fig. 15. *Z. favonia* Frr. ssp. *cadillaci* Obthr. (*Z. Cadillaci* Obthr., type ♀).

Fig. 16. *Z. favonia* Frr. ssp. *littoralis* Roths., type ♂.

Fig. 17. *Z. favonia* Frr. ssp. *maroccensis* Reiss (*Z. favonia aurata* f. *intermedia* Roths., type ♂).

Fig. 18. *Z. sarpedon* Hübn. ssp. *carmencita* Obthr. (*Z. Carmencita* Obthr., lectotype ♂).

Fig. 19. *Z. sarpedon* Hübn. ssp. *carmencita* Obthr. ab. *vernetensis* Obthr. (*Z. sarpedon* var. *vernetensis* Obthr., lectotype ♂).

Fig. 20. *Z. sarpedon* Hübn. ssp. *carmencita* Obthr. ab. *flava* Obthr., type ♂.

Fig. 21. *Z. contaminei* Boisd., lectotype ♂.

Fig. 22. *Z. contaminei* Boisd. ssp. (? ab.) *peñalabrica* Frndz. (*Z. peñalabrica* Frndz., type ♂).

Fig. 23. *Z. punctum* Ochs. ssp. *faitensis* Stdr., type ♂.

Fig. 24. *Z. punctum* Ochs. ssp. *faitensis* Stdr. ab. *pseudorubicundus* Stdr., type ♀.

Fig. 25. *Z. zuleïma* Pierr. ab. *flavescens* Roths., type ♂.

Fig. 26. *Z. erythrus* Hübn. ssp. *albipes* Vrty., lectotype ♂.

Fig. 27. *Z. erythrus* Hübn. ssp. *albipes* Vrty. ab. *erythraeformis* Vrty. (*Z. rubicundus* var. *erythraeformis* Vrty., lectotype ♂).

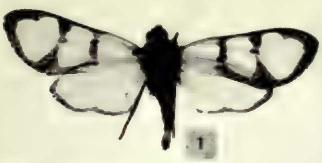
Fig. 28. *Z. diaphana* Stdgr. ssp. *sareptensis* Rebel ab. *citrina* Obthr. (*Z. erythrus* ab. *citrina* Obthr., type ♀).

Fig. 29. *Z. purpuralis* Brünn. ssp. *segontii* Trmn., holotype ♂.

Fig. 30. *Z. purpuralis* Brünn. ssp. *segontii* Trmn. ab. *obscura* Tutt.

Fig. 31. *Z. purpuralis* Brünn. ssp. *hibernica* Reiss. f. loc. *sabulosa* Trmn., holotype ♂.

Fig. 32. *Z. purpuralis* Brünn. ssp. *heringi* Zell. (*Z. Heringi* Zell., lectotype ♂).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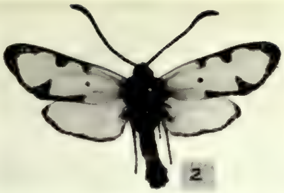
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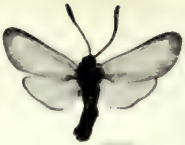
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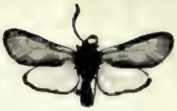
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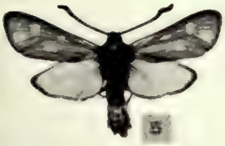
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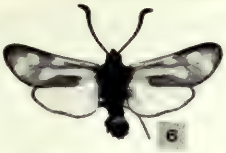
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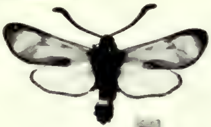
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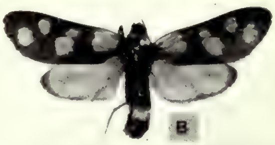
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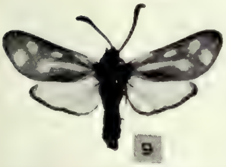
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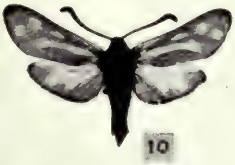
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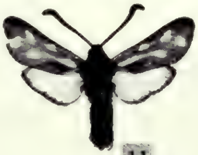
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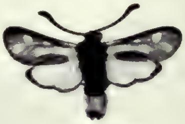
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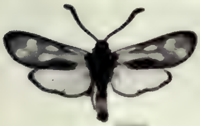
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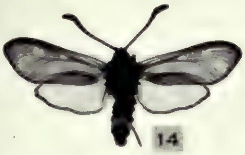
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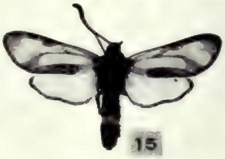
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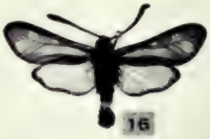
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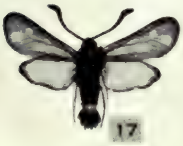
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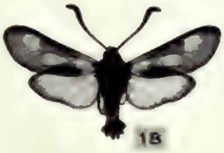
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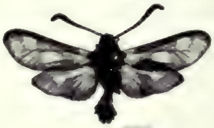
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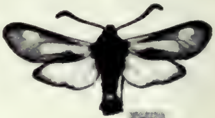
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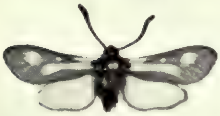
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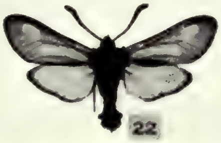
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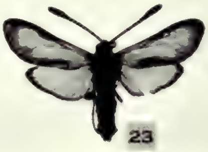
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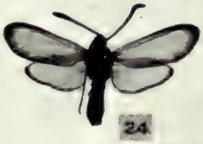
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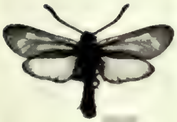
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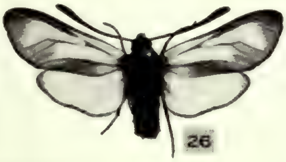
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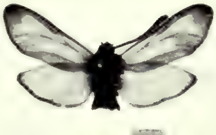
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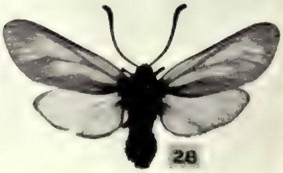
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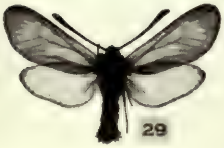
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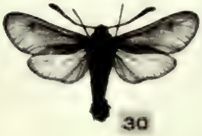
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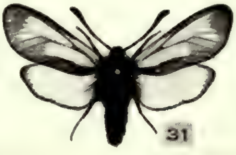
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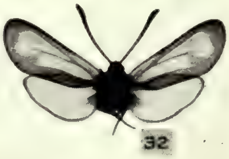
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PLATE 51

FIG. 1. *Zygaena purpuralis* Brünn. ssp. *hellena* Bgff. (*Z. purpuralis* var. *graeca* Tutt, lectotype ♂).
FIG. 2. *Z. purpuralis* Brünn. ssp. *pseudodiaphana* Trmn., holotype ♀.
FIG. 3. *Z. cocandica* Ersch. ssp. *pamira* Shelj. (*Z. avinoffi* Hamps., type ♂).
FIG. 4. *Z. afghana* Moore, type ♀.
FIG. 5. *Z. rothschildi* Reiss, type ♂.
FIG. 6. *Z. rothschildi* Reiss ab. *latecincta* Reiss & Trmn., holotype ♂.
FIG. 7. *Z. olivieri* Boisd., lectotype ♀.
FIG. 8. *Z. optima* Reiss ab. *tricolor* Reiss (*Z. nobilis* ab. *tricolor* Reiss, type ♀).
FIG. 9. *Z. fraxini* Mén. ssp. *oribasus* H.-S. (*Z. rognada* Boisd., type ♀).
FIG. 10. *Z. felix* Obthr., neotype ♂.
FIG. 11. *Z. excelsa* Roths. (*Z. marcouna* [*sic*] *excelsa* Roths., type ♂).
FIG. 12. *Z. marcuna* Obthr., lectotype ♂.
FIG. 13. *Z. alluaudi* Obthr., lectotype ♂.
FIG. 14. *Z. hilaris* Ochs. ssp. *galliae* Obthr., lectotype ♂.
FIG. 15. *Z. hilaris* Ochs. ssp. *galliae* Obthr. ab. *bicolor* Obthr., type ♀.
FIG. 16. *Z. hilaris* Ochs. ssp. *galliae* Obthr. ab. *unicolor* Obthr., type ♀.
FIG. 17. *Z. hilaris* Ochs. ssp. *galliae* Obthr. ab. *confluens* Obthr., type ♀.
FIG. 18. *Z. hilaris* Ochs. ssp. *ononidis* Mill. ab. *tricolor* Obthr., type ♀.
FIG. 19. *Z. hilaris* Ochs. ssp. *ononidis* Mill. ab. *foulquieri* Obthr., type ♂.
FIG. 20. *Z. hilaris* Ochs. ssp. *ononidis* Mill. ab. *aurantiaca* Obthr., type ♂.
FIG. 21. *Z. hilaris* Ochs. ssp. *escorialensis* Obthr., lectotype ♀.
FIG. 22. *Z. algira* Dup. (*Z. Bachagha* Obthr., ♂).
FIG. 23. *Z. algira* Dup. ab. *bicolor* Holl, type ♀.
FIG. 24. *Z. algira* Dup. ab. *aurantiaca* Holl, type ♀.
FIG. 25. *Z. fausta* L. ssp. *apocrypha* Le Charles ab. *tricolor* Obthr., lectotype ♂.
FIG. 26. *Z. fausta* L. ssp. *agilis* Reiss ab. *brunnea* Obthr., type ♂.
FIG. 27. *Z. fausta* L. ssp. *junceae* Obthr., lectotype ♂.
FIG. 28. *Z. fausta* L. ssp. *fortunata* Ramb. ab. *dupuyi* Obthr., type ♀.
FIG. 29. *Z. fausta* L. ssp. *fortunata* Ramb. ab. *melusina* Obthr., type ♀.
FIG. 30. *Z. orana* Dup. ab. *oberthüri* B.-B. (*Z. oberthüri* B.-B., type ♀).
FIG. 31. *Z. orana* Dup. ab. *barbara* H.-S. (*Z. nedroma* Obthr., type ♀).
FIG. 32. *Z. orana* Dup. ssp. *limitans* Roths. (*Z. carniolica limitans* Roths., type ♂).
FIG. 33. *Z. orana* Dup. ssp. *lahayei* Obthr., type ♂.
FIG. 34. *Z. orana* Dup. ssp. *lahayei* Obthr. ab. *powelli* Obthr., type ♂.
FIG. 35. *Z. orana* Dup. ssp. *allardi* Obthr. (*Z. allardi* Obthr., type ♂).
FIG. 36. *Z. orana* Dup. ssp. *contristans* Obthr., lectotype ♀.
FIG. 37. *Z. orana* Dup. ssp. *hajebensis* Reiss & Trmn., holotype ♂.
FIG. 38. *Z. youngi* Roths., type ♂.
FIG. 39. *Z. youngi* Roths. (*Z. orana media* Roths., type ♂).

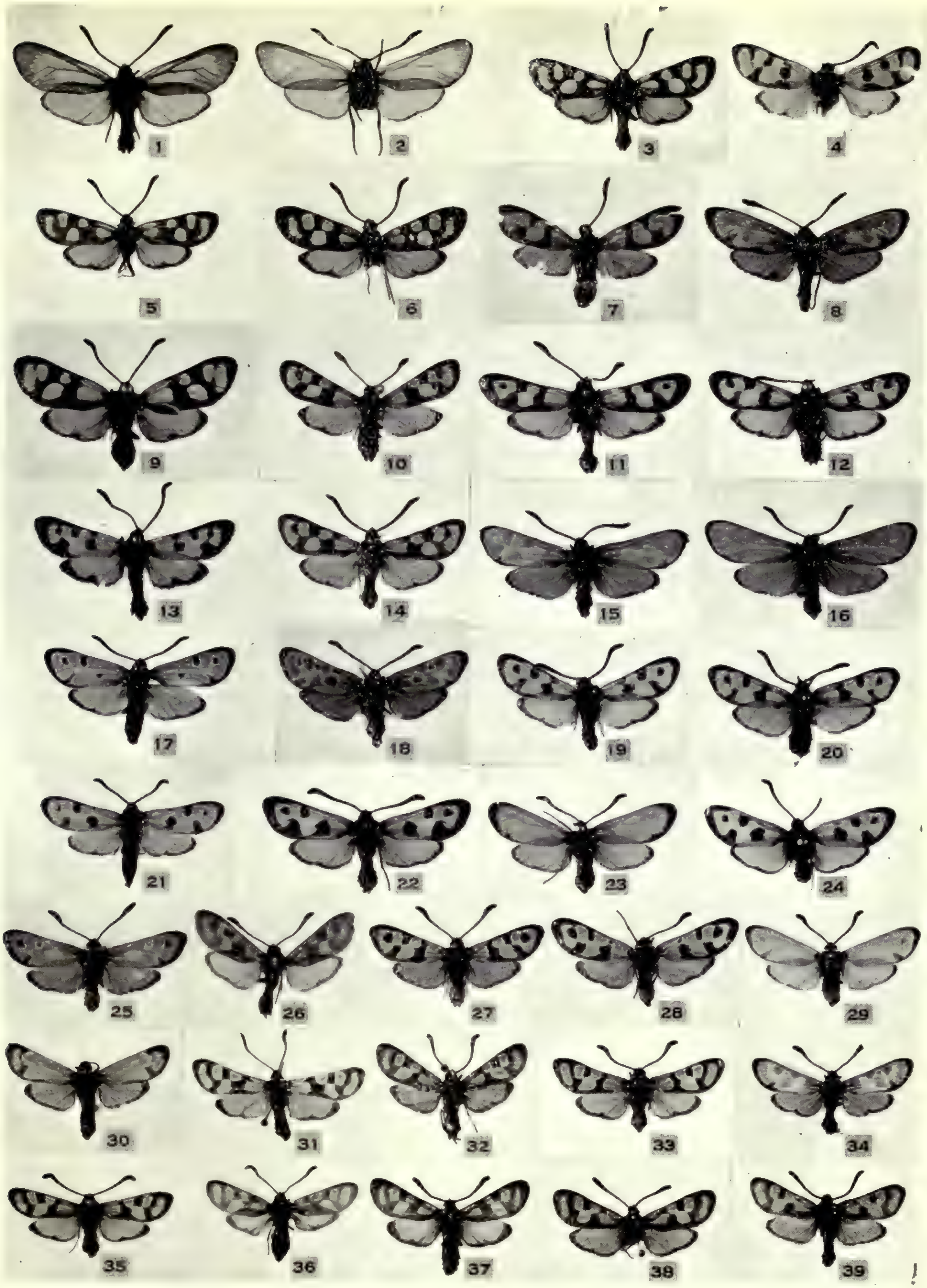
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PLATE 52

Fig. 1. *Zygaena harterti* Roths., type ♂.

Fig. 2. *Z. maroccana* Roths. (*Z. carniolica maroccana* Roths., type ♀).

Fig. 3. *Z. occitanica* de Vill. ab. *bicolor* Obthr. (*Z. carniolica-bicolor* Obthr., type ♂).

Fig. 4. *Z. carniolica* Scop. ssp. *diniensis* H.-S. ab. *melusina* Obthr., lectotype ♀.

Fig. 5. *Z. carniolica* Scop. ssp. *diniensis* H.-S. ab. *dupuyi* Obthr., type ♀.

Fig. 6. *Z. carniolica* Scop. ssp. *modesta* Bgff. ab. *detschi* Obthr., type ♂.

Fig. 7. *Z. carniolica* Scop. ssp. *valesiae* Bgff. ab. *amoena* Stdgr. (*Z. carniolica-tricolor* Obthr., type ♀).

Fig. 8. *Z. carniolica* Scop. ssp. *valesiae* Bgff. ab. *weileri-tricolor* Obthr., type ♂.

Fig. 9. *Z. carniolica* Scop. ssp. *onobrychis* Esp. ab. *totirubra* Seitz, type ♂.

Fig. 10. *Z. carniolica* Scop. ssp. *onobrychis* Esp. ab. *asymetrica* Obthr., type ♀.

Fig. 11. *Z. carniolica* Scop. ssp. *siciliana* Reiss (*A. carniolica sicilica* Ragusa, lectotype ♂).

Fig. 12. *Z. carniolica* Scop. ssp. *praestans* Obthr., lectotype ♀.

Fig. 13. *Z. exulans* R. & H. ab. *pallida* Tutt, ♀.

Fig. 14. *Z. exulans* R. & H. ssp. *subochracea* White, lectotype ♂.

Fig. 15. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *striata* Tutt, lectotype ♀.

Fig. 16. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *striata* Tutt (*Z. exulans* ab. *confluens* Obthr., type ♀).

Fig. 17. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *pulchra* Tutt, type ♀.

Fig. 18. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *minor* Tutt, lectotype ♂.

Fig. 19. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *flavilinea* Tutt, ♀.

Fig. 20. *Z. exulans* R. & H. ssp. *altaratensis* Le Ch. ab. *flava* Obthr., type ♂.

Fig. 21. *Z. loti* S. & D. ssp. *miniacea* Obthr., lectotype ♂.

Fig. 22. *Z. loti* S. & D. ssp. *miniacea* Obthr. ab. *flava* Obthr., lectotype ♂.

Fig. 23. *Z. loti* S. & D. ssp. *achillalpina* Bgff. (*Z. achilleae alpina* Obthr., lectotype ♂).

Fig. 24. *Z. loti* S. & D. ssp. *janthina* Boisd. (*Z. janthina* Boisd., type ♂).

Fig. 25. *Z. loti* S. & D. ssp. *wagneri* Mill. ab. *sexmacula* Dziurz. (*Z. achilleae wagneri* ab. *quadrimaculata* Obthr. lectotype ♂).

Fig. 26. *Z. loti* S. & D. ssp. *tristis* Obthr., lectotype ♂.

Fig. 27. *Z. loti* S. & D. ssp. *tristis* Obthr. ab. *brunnea* Obthr., type ♂.

Fig. 28. *Z. loti* S. & D. ssp. *aspera* Bgff. f.t. *italica-aestivalis* Obthr., lectotype ♂.

Fig. 29. *Z. loti* S. & D. ssp. *castellana* Stdr., type ♀.

Fig. 30. *Z. loti* S. &. D. ssp. *restricta* Stdr. (*Z.* hybr. f. *punctachilleae* Stdr., lectotype ♂).

Fig. 31. *Z. loti* S. & D. ssp. *restricta* Stdr. (*Z.* hybr. f. *punctmeliloti* Stdr., lectotype ♂).

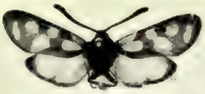
Fig. 32. *Z. loti* S. & D. ssp. *restricta* Stdr. (*Z.* hybr. f. *melilorestricta* Stdr., lectotype ♂).

Fig. 33. *Z. graslini* Led. ab. *confluens* Obthr., type ♂.

Fig. 34. *Z. anthyllidis* Boisd., lectotype ♂.

Fig. 35. *Z. rhadamanthus* Esp. ssp. *stygia* Bgff. ab. *quinquemaculata* Obthr., lectotype ♂.

Fig. 36. *Z. rhadamanthus* Esp. ssp. *stygia* Bgff. ab. *obscura* Obthr., type ♂.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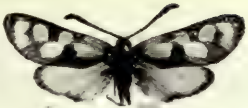
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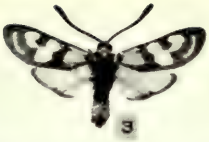
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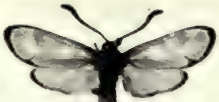
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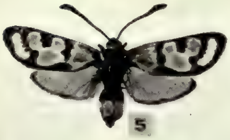
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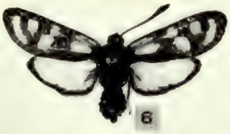
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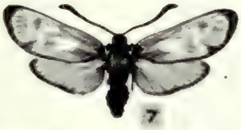
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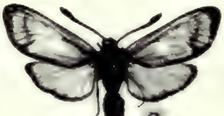
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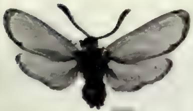
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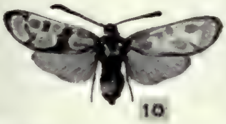
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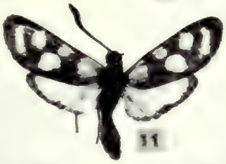
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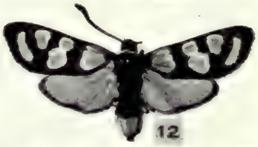
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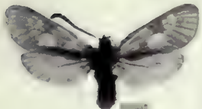
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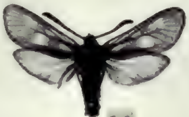
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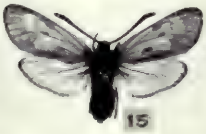
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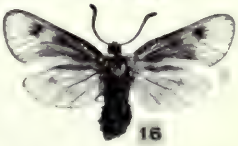
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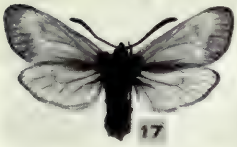
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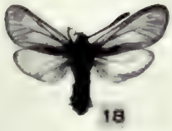
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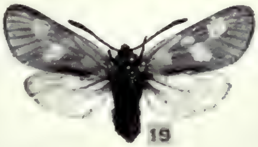
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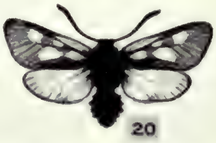
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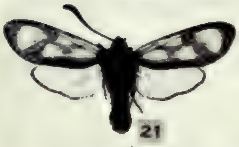
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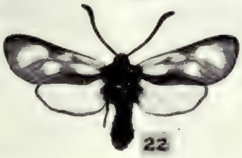
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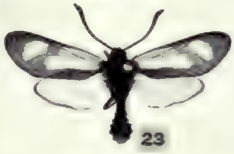
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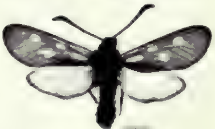
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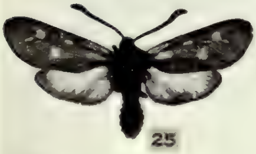
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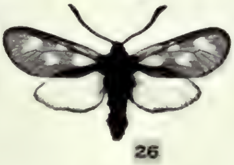
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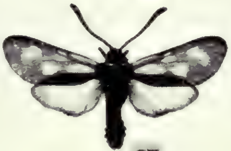
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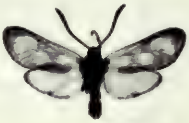
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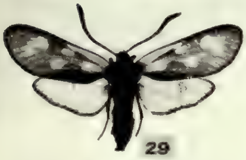
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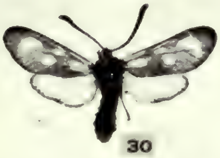
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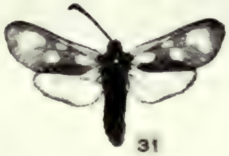
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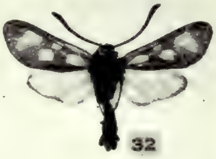
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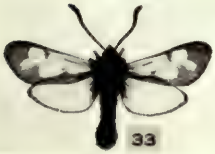
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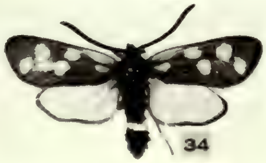
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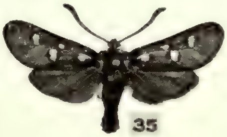
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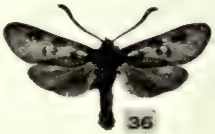
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PLATE 53

FIG. 1. *Zygaena rhadamanthus* Esp. ssp. *grisea* Obthr., type ♀.

FIG. 2. *Z. rhadamanthus* Esp. ssp. *grisea* Obthr. ab. *guenéei* Obthr., type ♂.

FIG. 3. *Z. rhadamanthus* Esp. ssp. *alfacarensis* Reiss ab. *flava* Obthr., type ♂.

FIG. 4. *Z. rhadamanthus* Esp. ssp. *barcina* Vrty. ab. *kiesenwetterii* H.-S. (*Z. staechadis* Boisd., type ♂).

FIG. 5. *Z. oxytropis* Boisd., type ♂.

FIG. 6. *Z. theryi* de Joannis (*Z. lavandulae nisseni* Roths., type ♂).

FIG. 7. *Z. lavandulae* Esp. ab. *siepii* Obthr., type ♂.

FIG. 8. *Z. lavandulae* Esp. ab. *powelli* Obthr., type ♂.

FIG. 9. *Z. ephialtes* L. ab. *wullschlegeli* Obthr., type ♂.

FIG. 10. *Z. ephialtes* L. ab. *falcatae* Obthr., type ♀.

FIG. 11. *Z. ephialtes* L. ab. *scheveni* Obthr., lectotype ♀.

FIG. 12. *Z. ephialtes* L. ab. *esperi* Obthr., lectotype ♀.

FIG. 13. *Z. ephialtes* L. ab. *pallens* Obthr., type ♂.

FIG. 14. *Z. ephialtes* L. ssp. *athamanthae* Esp. ab. *pallida* Obthr., type ♂.

FIG. 15. *Z. ephialtes* L. ssp. *athamanthae* Esp. ab. *adalberti* Obthr., ♀.

FIG. 16. *Z. ephialtes* L. ssp. *meridiei* Bgff. ab. *decolorata* Stdr., type ♀.

FIG. 17. *Z. transalpina* Esp. ssp. *maritima* Obthr. (*Z. maritima* Obthr., lectotype ♂).

FIG. 18. *Z. transalpina* Esp. ssp. *maritima* Obthr. (*Z. xanthographa helvetica* Roths. & B.-B., lectotype ♂).

FIG. 19. *Z. transalpina* Esp. ssp. *maritima* Obthr. ab. *trimacula* Reiss (*Z. transalpina maritima* ab. *trimaculata* Obthr., type ♀).

FIG. 20. *Z. transalpina* Esp. ssp. *alpina* Boisd. ab. *flava* Obthr., type ♂.

FIG. 21. *Z. transalpina* Esp. ssp. *alpina* Boisd. ab. *grisescens* Obthr., type ♂.

FIG. 22. *Z. transalpina* Esp. ssp. *sorrentina* Stdgr. ab. *impar* Obthr., lectotype ♂.

FIG. 23. *Z. transalpina* Esp. ssp. *sorrentina* Stdgr. ab. *aurantiaca* Obthr., type ♀.

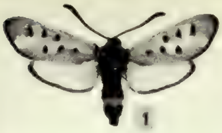
FIG. 24. *Z. transalpina* Esp. ssp. *altitudinaria* Turati f. t. *aestivalis* Obthr., lectotype ♂.

FIG. 25. *Z. transalpina* Esp. ssp. *athicaria* Bgff. (*Z. transalpina* ssp. *costazzina* Stdr., type ♂).

FIG. 26. *Z. hippocrepidis* Hübn. ssp. *centralis* Obthr., lectotype ♂.

FIG. 27. *Z. hippocrepidis* Hübn. ssp. *centralis* Obthr. ab. *nigricans* Obthr., type ♂.

FIG. 28. *Z. hippocrepidis* Hübn. ssp. *centralis* Obthr. ab. *flava* Obthr., type ♂.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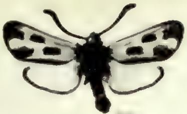
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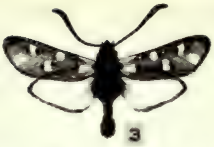
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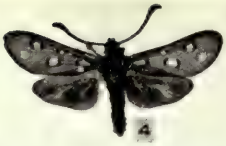
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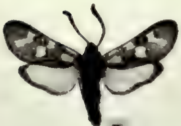
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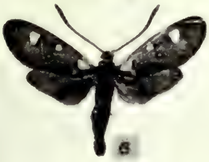
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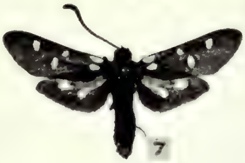
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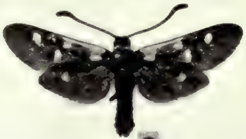
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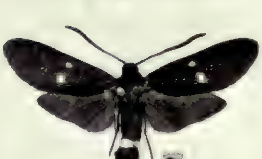
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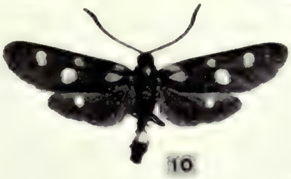
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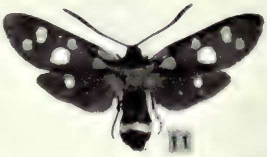
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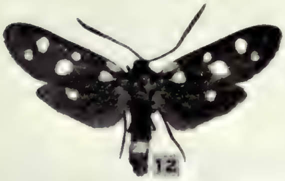
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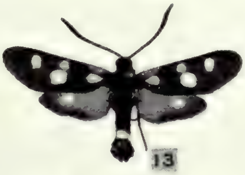
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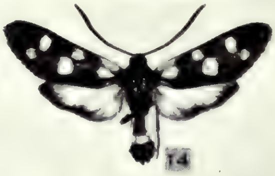
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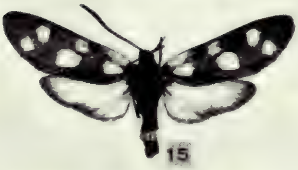
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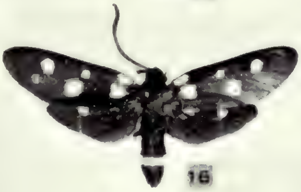
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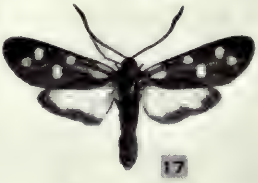
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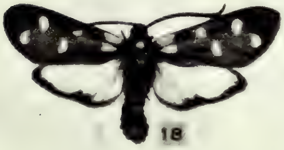
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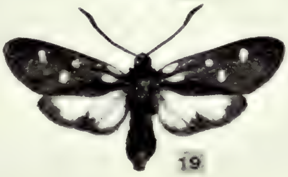
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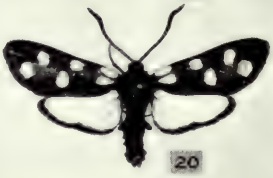
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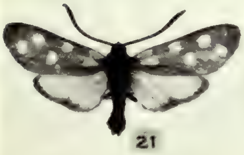
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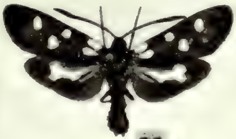
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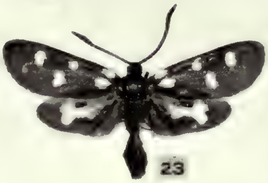
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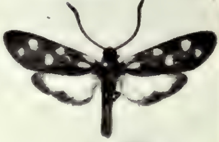
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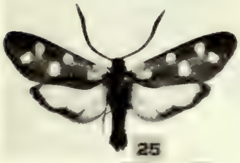
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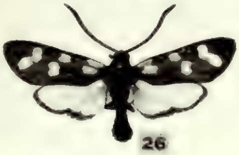
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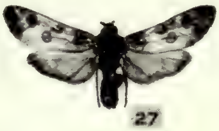
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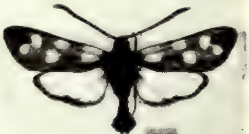
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PLATE 54

Fig. 1. *Zygaena hippocrepidis* Hübn. ssp. *provincialis* Obthr., lectotype ♀.

Fig. 2. *Z. hippocrepidis* Hübn. ssp. *provincialis* Obthr. (*Z. transalpina* f. *meridionalis* Obthr., lectotype ♂).

Fig. 3. *Z. hippocrepidis* Hübn. ssp. *occidentalis* Obthr., lectotype ♂.

Fig. 4. *Z. hippocrepidis* Hübn. ssp. *occidentalis* Obthr. ab. *micingulata* Obthr., lectotype ♀.

Fig. 5. *Z. hippocrepidis* Hübn. ssp. *occidentalis* Obthr. ab. *pallidior* Obthr., lectotype ♀.

Fig. 6. *Z. hippocrepidis* Hübn. ssp. *occidentalis* Obthr. ab *rosea* Obthr., lectotype ♂.

Fig. 7. *Z. hippocrepidis* Hübn. ssp. *occidentalis* Obthr. ab. *vigei* Obthr., lectotype ♀.

Fig. 8. *Z. viciae* S. & D. ssp. *anglica* Reiss ab. *confluens* Tutt, ♂.

Fig. 9. *Z. viciae* S. & D. ssp. *anglica* Reiss ab. *sexpunctata* Tutt, ♀.

Fig. 10. *Z. viciae* S. & D. ssp. *teriolensis* Spey. ab. *decora* Led. (*Z. Charon* var. *Cingulata* Frey, type ♀).

Fig. 11. *Z. viciae* S. &. D. ssp. *giussana* Stdr., type ♂.

Fig. 12. *Z. viciae* S. & D. ssp. *sicula* Calb. ab. *melilotoides* Ragusa, lectotype ♂.

Fig. 13. *Z. viciae* S. & D. ssp. *sicula* Calb. ab. *cingulata* Ragusa (*A. punctum* ssp. *contamineoides* ab. *cingulata* Ragusa, type ♀).

Fig. 14. *Z. viciae* S. & D. ssp. *stentzii* Frr. (*Z. Dorycnii Stentzii* Frr., lectotype ♂).

Fig. 15. *Z. viciae* S. & D. ssp. *dahurica* Boisd. (*Z. dahurica* Boisd., type ♂).

Fig. 16. *Z. niphona* Butler, type ♂.

Fig. 17. *Z. gallica* Obthr. (*Z. Corycia* var. *gallica* Obthr., lectotype ♂).

Fig. 18. *Z. dalmatina* Boisd., type ♂.

Fig. 19. *Z. filipendulae* L. ssp. *anglicola* Trmn., holotype ♂.

Fig. 20. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *grisescens* Obthr., type ♂.

Fig. 21. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *confluens* Obthr., type ♂.

Fig. 22. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *proconfluens* Tutt, lectotype ♂.

Fig. 23. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *quinquejuncta* Tutt, lectotype ♀.

Fig. 24. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *spoliata* Cockayne, type ♂.

Fig. 25. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *brunnescens* Cockayne, type ♂.

Fig. 26. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *griseorosea* Cockayne, type ♂.

Fig. 27. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *nigrolimbata* Cockayne, type ♂.

Fig. 28. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *aurantia* Tutt, ♂.

Fig. 29. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *trivittata* Tutt, type ♀.

Fig. 30. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *flava* Robs., lectotype ♂.

Fig. 31. *Z. filipendulae* L. ssp. *anglicola* Trmn. ab. *flava* Robs. (*Z. filipendulae* ab. *flava* Obthr., type ♂).

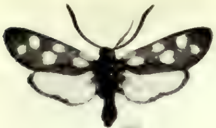
Fig. 32. *Z. filipendulae* L. ssp. *anglicola* Trmn. f. loc. *degenerata* Trmn., holotype ♂.

Fig. 33. *Z. filipendulae* L. ssp. *anglicola* Trmn. f. loc. *degenerata* Trmn. ab. *pallida* Tutt, type ♀).

Fig. 34. *Z. filipendulae* L. ssp. *anglicola* Trmn. f. t. *stephensi* Dupont, lectotype ♂.

Fig. 35. *Z. filipendulae* L. ssp. *anglicola* Trmn. f. t. *stephensi* Dupont ab. *minor* Tutt, lectotype ♂).

Fig. 36. *Z. filipendulae* L. ssp. *ochsenheimeri* Zell. (*Z. charon* Boisd., type ♂).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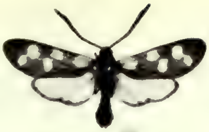
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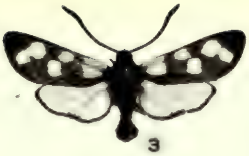
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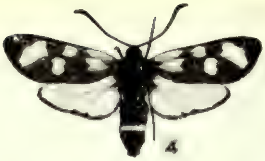
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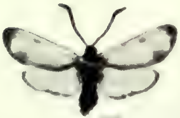
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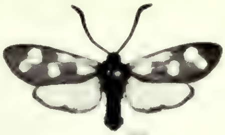
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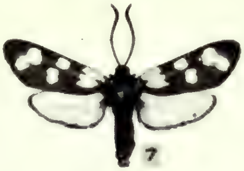
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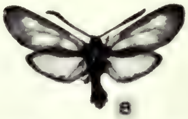
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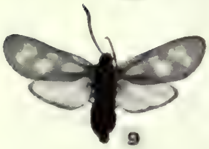
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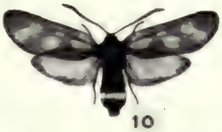
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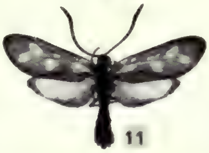
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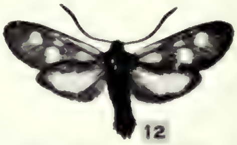
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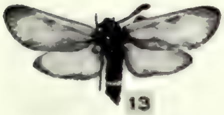
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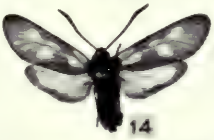
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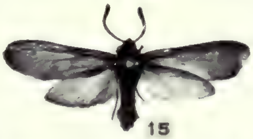
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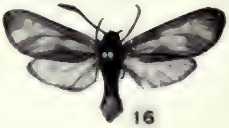
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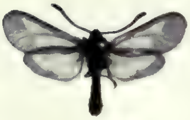
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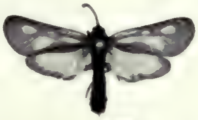
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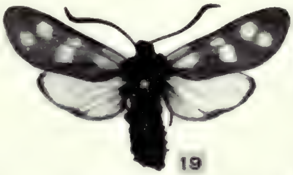
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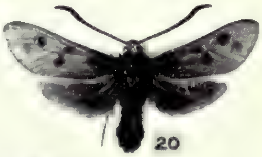
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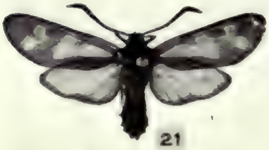
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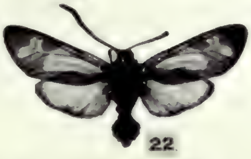
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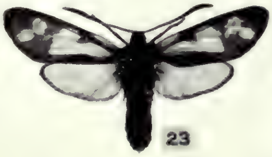
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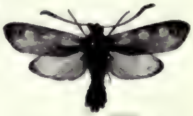
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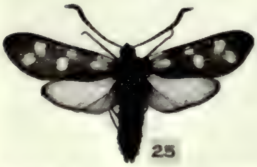
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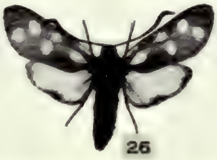
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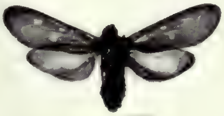
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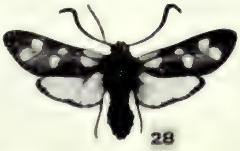
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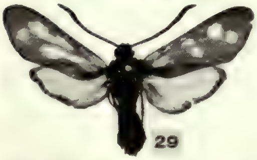
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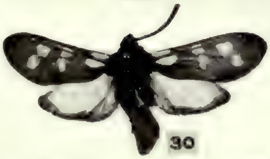
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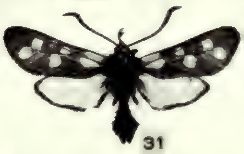
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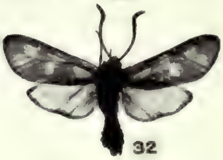
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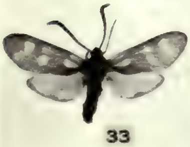
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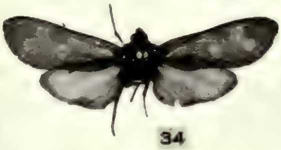
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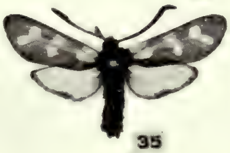
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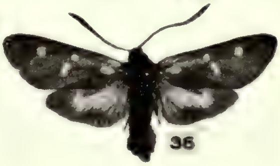
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PLATE 55

Fig. 1. *Zygaena filipendulae* L. ssp. *ochsenheimeri* Zell. ab. *translonicerae* Stdr. (*Z.* hybr. f. *translonicerae* Stdr., type ♂).

Fig. 2. *Z. filipendulae* L. ssp. *restituta* Rocci ab. *achillfilipendulae* Stdr. (*Z.* hybr. f. *achillfilipendulae* Stdr., type ♀).

Fig. 3. *Z. filipendulae* L. ssp. *veneta* Rocci (*Z.* hybr. f. *melilofilipendulae* Stdr., type ♀).

Fig. 4. *Z. filipendulae* L. ssp. *duponcheli* Vrty. ab. *flava* Obthr., type ♂.

Fig. 5. *Z. filipendulae* L. ssp. *pyrenes* Vrty. (*Z. Dubia-quinquemaculata* Obthr., lectotype ♂).

Fig. 6. *Z. filipendulae* L. ssp. *pyrenes* Vrty. ab. *sexmaculata* Obthr. (*Z. Dubia-sexmaculata* Obthr., type ♂).

Fig. 7. *Z. filipendulae* L. ssp. *anceps* Obthr., lectotype ♂.

Fig. 8. *Z. filipendulae* L. ssp. *anceps* Obthr. (*Z. filipendulae* var. *quinquemacula* B.-B. lectotype ♀).

Fig. 9. *Z. filipendulae* L. ssp. *campaniae* Rebel (*Z.* hybr. f. *melilocampaniae* Stdr., type ♂).

Fig. 10. *Z. filipendulae* L. ssp. *campaniae* Rebel (*Z.* hybr. f. *hybridophila* Stdr., lectotype ♀).

Fig. 11. *Z. filipendulae* L. ssp. *campaniae* Rebel (*Z.* hybr. f. *calabrochsenheimeri* Stdr., type ♂).

Fig. 12. *Z. filipendulae* L. ssp. *campaniae* Rebel (*Z.* hybr. f. *melilochsenheimeri* Stdr., type ♀).

Fig. 13. *Z. filipendulae* L. ssp. *campaniae* Rebel ab. *carnioligiussana* Stdr. (*Z.* hybr. f. *carnioligiussana* Stdr., type ♂).

Fig. 14. *Z. filipendulae* L. ssp. *campaniae* Rebel ab. *dubia* Stdgr. (*Z.* hybr. f. *melilodubia* Stdr., type ♂).

Fig. 15. *Z. filipendulae* L. ssp. *seeboldi* Obthr., lectotype ♂.

Fig. 16. *Z. filipendulae* L. ssp. *ramburii* H.-S. ab. *rosa* Obthr. (*Z. rosa* Obthr., type ♂).

Fig. 17. *Z. trifolii* Esp. ssp. *palustrella* Vrty. ab. *pygmaea* Cockayne, type ♂.

Fig. 18. *Z. filipendulae* L. ssp. *syriaca* Obthr. (*Z. Syriaca* Obthr., lectotype ♀).

Fig. 19. *Z. filipendulae* L. ssp. *syriaca* Obthr., paralectotype ♂.

Fig. 20. *Z. filipendulae* L. ssp. *syriaca* Obthr. ab. *quinquemaculata* Obthr., type ♂.

Fig. 21. *Z. filipendulae* L. ssp. *syriaca* Obthr. ab. *confluens* Obthr., type ♀.

Fig. 22. *Z. trifolii* Esp. ssp. *palustrella* Vrty. ab. *extrema* Tutt, type ♂.

Fig. 23. *Z. trifolii* Esp. ssp. *palustrella* Vrty. ab. *obsoleta* Tutt, type ♂.

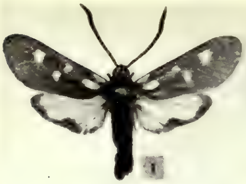
Fig. 24. *Z. trifolii* Esp. ssp. *decreta* Vrty. (*Z. trifolii-major* Tutt, lectotype ♀).

Fig. 25. *Z. trifolii* Esp. ssp. *decreta* Vrty. ab. *carnea* Cockayne, type ♂.

Fig. 26. *Z. trifolii* Esp. ssp. *decreta* Vrty. ab. *obscura* Tutt, type ♂.

Fig. 27. *Z. trifolii* Esp. ssp. *palustris* Obthr., lectotype ♀.

PLATE 55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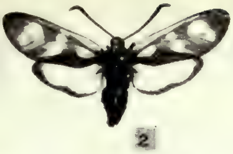
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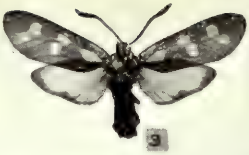
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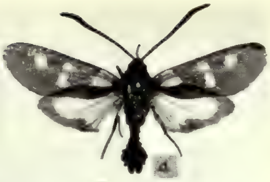
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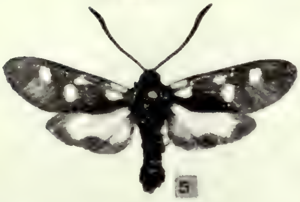
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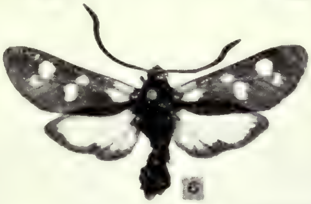
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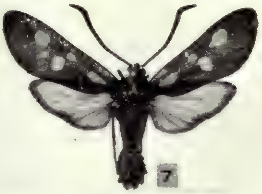
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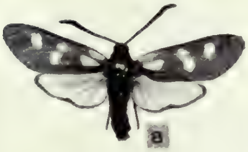
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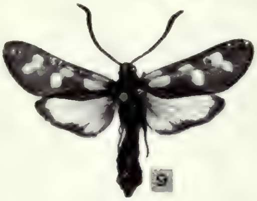
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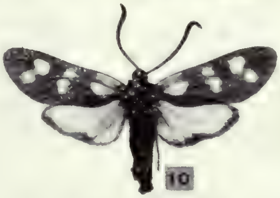
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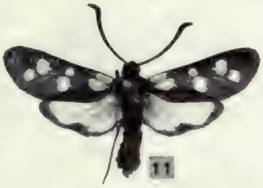
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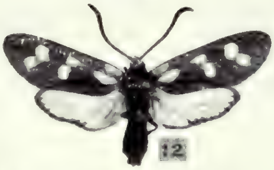
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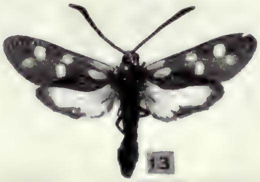
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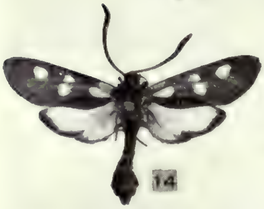
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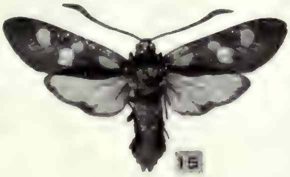
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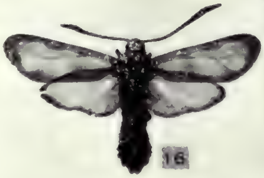
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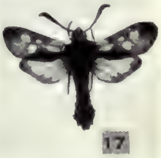
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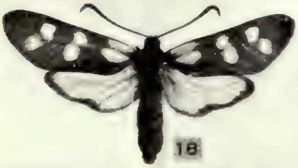
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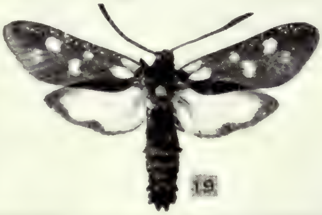
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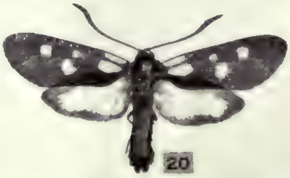
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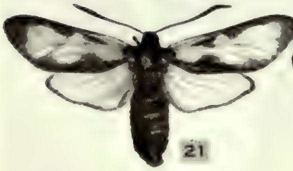
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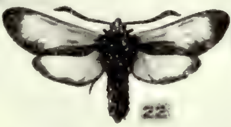
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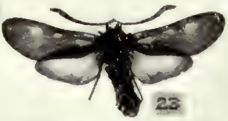
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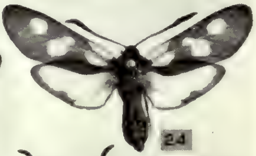
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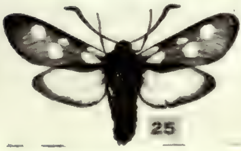
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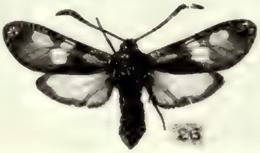
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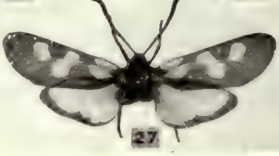
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PLATE 56

Fig. 1. *Zygaena trifolii* Esp. ssp. *palustris* Obthr. ♂ (Boisduval's specimen).

Fig. 2. *Z. trifolii* Esp. ssp. *palustris* Obthr. ab. *sexmaculata* Obthr., type ♂.

Fig. 3. *Z. trifolii* Esp. ssp. *palustris* Obthr. ab. *confluens* Obthr., type ♀.

Fig. 4. *Z. trifolii* Esp. ssp. *palustris* Obthr. ab. *confluens-sexmaculata* Obthr., type ♂.

Fig. 5. *Z. trifolii* Esp. ssp. *palustris* Obthr. ab. *nigricans* Obthr., type ♂.

Fig. 6. *Z. trifolii* Esp. ssp. *olbiana* Obthr. (*Z. Olbiana* Obthr., type ♂).

Fig. 7. *Z. trifolii* Esp. ssp. *duponcheliana* Obthr. (*Z. Duponcheliana* Obthr., type ♂).

Fig. 8. *Z. trifolii* Esp. ssp. *syracusia* Zell. (*Z. Syracusia* Zell., lectotype ♂).

Fig. 9. *Z. trifolii* Esp. ssp. *trinacria* Vrty. (*Z. lonicerae trinacria* Vrty., lectotype ♂).

Fig. 10. *Z. trifolii* Esp. ssp. *trinacria* Vrty. ab. *krügeri* Ragusa (*A. trifolii syracusia* var. *Krügeri* Ragusa, lectotype ♀).

Fig. 11. *Z. trifolii* Esp. ssp. *caerulescens* Reiss (*Z. australis* var. *caerulescens* Obthr., lectotype ♂).

Fig. 12. *Z. trifolii* Esp. ssp. *australis* Obthr. (*Z. Australis* Obthr., lectotype ♂).

Fig. 13. *Z. trifolii* Esp. ssp. *australis* Obthr. ab. *aurorina* Obthr., lectotype ♂.

Fig. 14. *Z. trifolii* Esp. ssp. *australis* Obthr. ab. *ruficostata* Holl, type ♂.

Fig. 15. *Z. trifolii* Esp. ssp. *seriziati* Obthr. (*Z. seriziati* Obthr., type ♂).

Fig. 16. *Z. trifolii* Esp. ssp. *diffusemarginata* Roths., type ♂.

Fig. 17. *Z. trifolii* Esp. ssp. *barcelonensis* Reiss f.t. *intricata* Sag. ab. *depravata* Sag. (*Z. clorinda* B.-B., holotype ♂).

Fig. 18. *Z. lonicerae* Schev. ab. *asymetrica* Obthr., type ♀.

Fig. 19. *Z. lonicerae* Schev. ab. *citrina* Spey. (*Z. lonicerae* ab. *flava* Obthr., type ♀).

Fig. 20. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *cuneata* Tutt, type ♂.

Fig. 21. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *centripuncta* Tutt, lectotype ♀.

Fig. 22. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *minor* Tutt, type ♂.

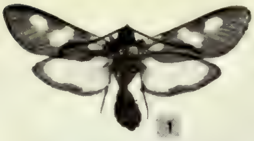
Fig. 23. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *eboracae* Prest (*Z. eboracae* Prest, lectotype ♂).

Fig. 24. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *grisescens* Cockayne, type ♂.

Fig. 25. *Z. lonicerae* Schev. ssp. *transferens* Vrty. f. loc. *latomarginata* Tutt, lectotype ♂.

Fig. 26. *Z. lonicerae* Schev. ssp. *insularis* Trmn., holotype ♀.

Fig. 27. *Z. lonicerae* Schev. ssp. *major* Frey, lectotype ♀.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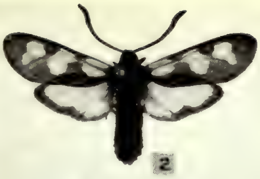
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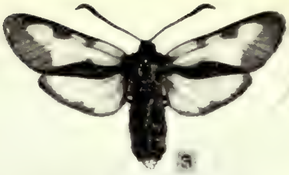
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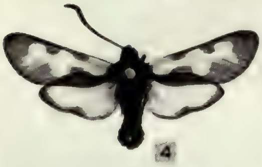
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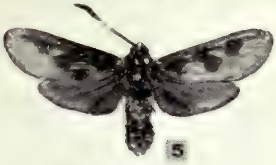
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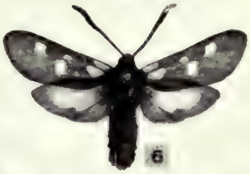
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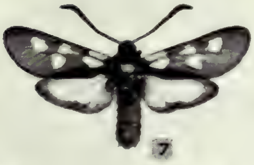
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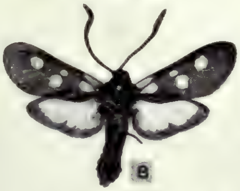
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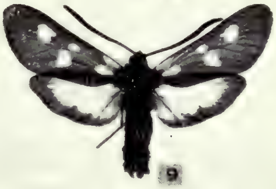
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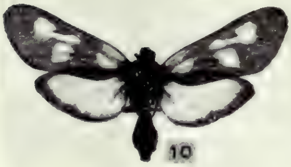
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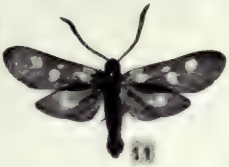
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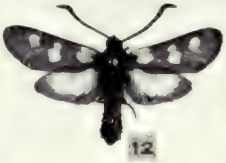
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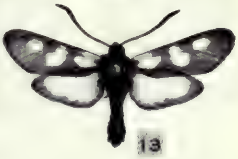
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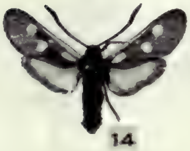
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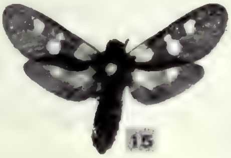
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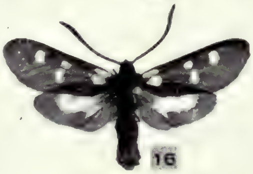
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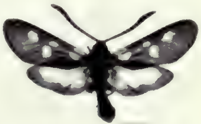
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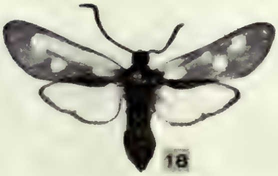
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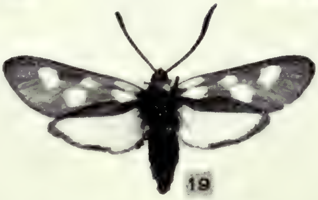
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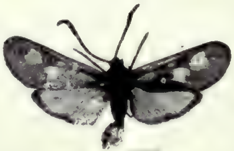
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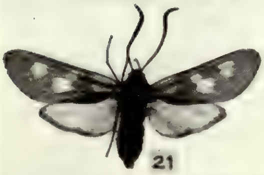
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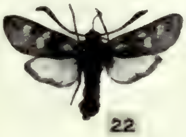
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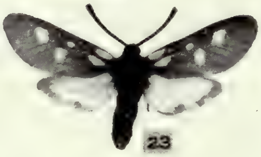
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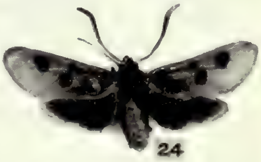
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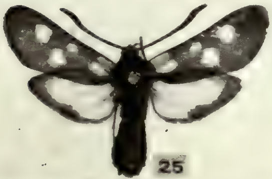
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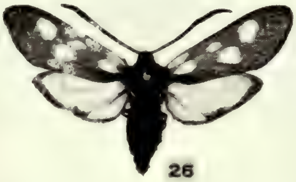
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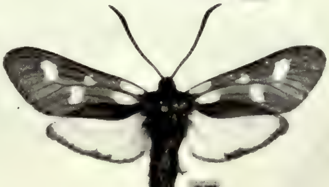
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PLATE 57

Fig. 1. *Zygaena lonicerae* Schev. ssp. *major* Frey ab. *incendium* Obthr., type ♂.

Fig. 2. *Z. lonicerae* Schev. ssp. *major* Frey ab. *confluens* Obthr., 1896 (*Z. Dubia* ab. *confluens* Obthr., type ♂).

Fig. 3. *Z. lonicerae* Schev. ssp. *major* Frey ab. *confluens* Obthr. (*Z. lonicerae* ab. *confluens* Obthr., 1911, type ♀).

Fig. 4. *Z. lonicerae* Schev. ssp. *major* Frey ab. *nigerrima* Curtis (*Z. trifolii* ab. *nigerrima* Curtis, type ♀).

Fig. 5. *Z. lonicerae* Schev. ssp. *major* Frey ab. *semidiaphana* Stdr., type ♀.

Fig. 6. *Z. lonicerae* Schev. ssp. *kindermanni* Obthr., lectotype ♂.

Fig. 7. *Z. filipendulae* L. ssp. *himmighoffeni* Bgff., ♂ (*Z. lonicerae Kindermanni* Obthr., [*partim*]).

Fig. 8. *Z. favonia* Frr. ssp. *littoralis* Roths. (*Z. loyselis ungemachi* Le Cerf, Roths. nec Le Cerf, ab. *cingulata* Reiss, lectotype ♀).

Fig. 9. *Z. corsica* Boisd. ssp. *sardiniensis* Holik, cotype ♂.

Fig. 10. *Z. corycia* Stdgr. ssp. *staudingeriana* Reiss, cotype ♂.

Fig. 11. *Z. speciosa* Reiss ssp. *suleimanicola* Reiss, cotype ♀.

Fig. 12. *Z. alpherakyi* Shelj. ssp. *ossetica* Holik, cotype ♂.

Fig. 13. *Z. diaphana* Stdgr. (*Z. pilosellae* var. *diaphana* Stdgr., paralectotype ♂).

Fig. 14. *Z. diaphana* Stdgr. ssp. *sareptensis* Rebel (*Z. purpuralis* var. *sareptensis* Rebel, paralectotype ♀).

Fig. 15. *Z. johannae* Le Cerf ssp. *turbeti* Le Cerf, cotype ♂.

Fig. 16. *Z. cocandica* Ersch. ssp. *banghaasi* Bgff., cotype ♂.

Fig. 17. *Z. mangeri* Bgff., cotype ♀.

Fig. 18. *Z. escalerai* Pouj., paratype ♂.

Fig. 19. *Z. olivieri* Boisd. ssp. *libanicola* Bgff., cotype ♂.

Fig. 20. *Z. sogdiana* Ersch. ssp. *tshimganica* Holik, cotype ♂.

Fig. 21. *Z. formosa* H.-S. ssp. *kotzschi* Reiss (*Z. kotzschi* Reiss, cotype ♂).

Fig. 22. *Z. carniolica* Scop. ssp. *parisiensis* Holik, paratype ♂.

Fig. 23. *Z. carniolica* Scop. ssp. *syrmica* Holik, cotype ♀.

Fig. 24. *Z. loti* S. & D. ssp. *karatshaica* Shelj., cotype ♂.

Fig. 25. *Z. erebus* Stdgr. ssp. *chaos* Bgff. (*Z. chaos* Bgff., cotype ♂).

Fig. 26. *Z. nevadensis* Ramb. ssp. *schmidti* Reiss (*Z. scabiosae* ssp. *schmidti* Reiss, cotype ♂).

Fig. 27. *Z. filipendulae* L. ssp. *calxensis* Le Charles, paratype ♂.

Fig. 28. *Z. filipendulae* L. ssp. *ciscaucasica* Shelj., cotype ♂.

Fig. 29. *Z. filipendulae* L. ssp. *wojtusiaki* Holik, cotype ♀.

Fig. 30. *Z. lonicerae* Schev. ssp. *deludens* Koch, paratype ♀.

Fig. 31. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *miniata* Tutt, type ♂.

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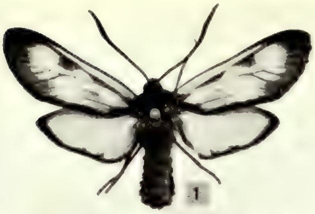
RAL HISTORY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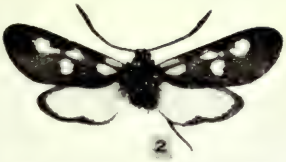
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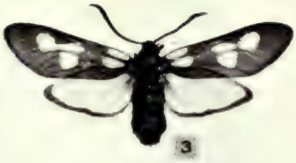
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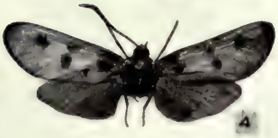
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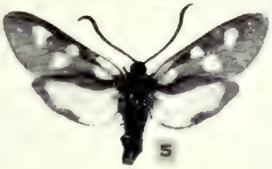
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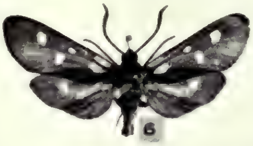
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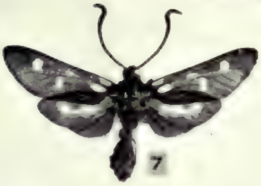
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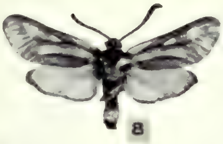
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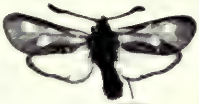
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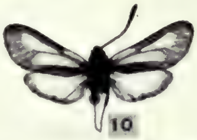
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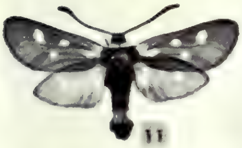
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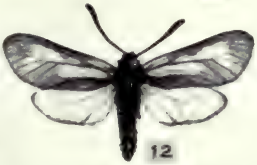
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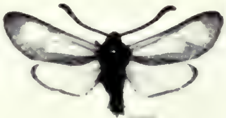
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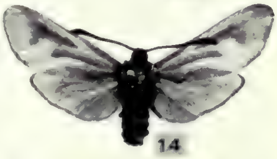
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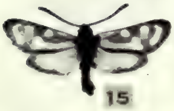
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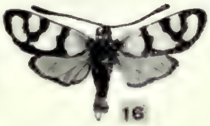
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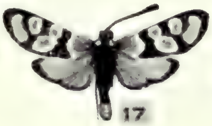
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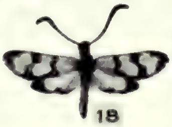
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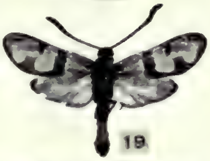
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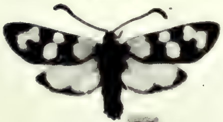
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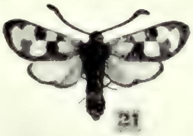
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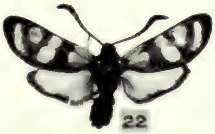
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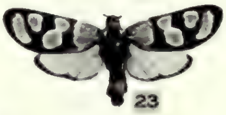
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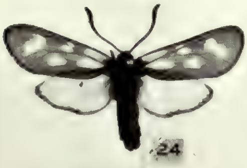
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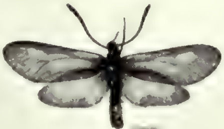
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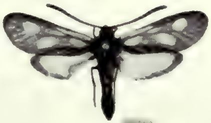
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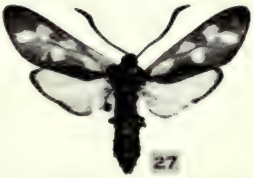
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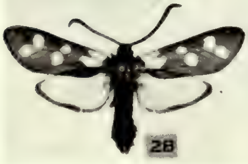
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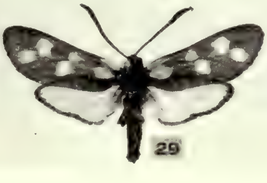
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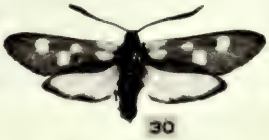
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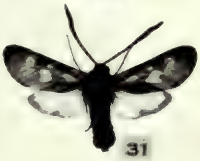
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PLATE 57

Fig. 1. *Zygaena lonicerae* Schev. ssp. *major* Frey ab. *incendium* Obthr., type ♂.

Fig. 2. *Z. lonicerae* Schev. ssp. *major* Frey ab. *confluens* Obthr., 1896 (*Z. Dubia* ab. *confluens* Obthr., type ♂).

Fig. 3. *Z. lonicerae* Schev. ssp. *major* Frey ab. *confluens* Obthr. (*Z. lonicerae* ab. *confluens* Obthr., 1911, type ♀).

Fig. 4. *Z. lonicerae* Schev. ssp. *major* Frey ab. *nigerrima* Curtis (*Z. trifolii* ab. *nigerrima* Curtis, type ♀).

Fig. 5. *Z. lonicerae* Schev. ssp. *major* Frey ab. *semidiaphana* Stdr., type ♀.

Fig. 6. *Z. lonicerae* Schev. ssp. *kindermanni* Obthr., lectotype ♂.

Fig. 7. *Z. filipendulae* L. ssp. *himmighoffeni* Bgff., ♂ (*Z. lonicerae Kindermanni* Obthr., [*partim*]).

Fig. 8. *Z. favonia* Frr. ssp. *littoralis* Roths. (*Z. loyselis ungemachi* Le Cerf, Roths. nec Le Cerf, ab. *cingulata* Reiss, lectotype ♀).

Fig. 9. *Z. corsica* Boisd. ssp. *sardiniensis* Holik, cotype ♂.

Fig. 10. *Z. corycia* Stdgr. ssp. *staudingeriana* Reiss, cotype ♂.

Fig. 11. *Z. speciosa* Reiss ssp. *suleimanicola* Reiss, cotype ♀.

Fig. 12. *Z. alpherakyi* Shelj. ssp. *ossetica* Holik, cotype ♂.

Fig. 13. *Z. diaphana* Stdgr. (*Z. pilosellae* var. *diaphana* Stdgr., paralectotype ♂).

Fig. 14. *Z. diaphana* Stdgr. ssp. *sareptensis* Rebel (*Z. purpuralis* var. *sareptensis* Rebel, paralectotype ♀).

Fig. 15. *Z. johannae* Le Cerf ssp. *turbeti* Le Cerf, cotype ♂.

Fig. 16. *Z. cocandica* Ersch. ssp. *banghaasi* Bgff., cotype ♂.

Fig. 17. *Z. mangeri* Bgff., cotype ♀.

Fig. 18. *Z. escalerai* Pouj., paratype ♂.

Fig. 19. *Z. olivieri* Boisd. ssp. *libanicola* Bgff., cotype ♂.

Fig. 20. *Z. sogdiana* Ersch. ssp. *tshimganica* Holik, cotype ♂.

Fig. 21. *Z. formosa* H.-S. ssp. *kotzschi* Reiss (*Z. kotzschi* Reiss, cotype ♂).

Fig. 22. *Z. carniolica* Scop. ssp. *parisiensis* Holik, paratype ♂.

Fig. 23. *Z. carniolica* Scop. ssp. *syrmica* Holik, cotype ♀.

Fig. 24. *Z. loti* S. & D. ssp. *karatshaica* Shelj., cotype ♂.

Fig. 25. *Z. erebus* Stdgr. ssp. *chaos* Bgff. (*Z. chaos* Bgff., cotype ♂).

Fig. 26. *Z. nevadensis* Ramb. ssp. *schmidti* Reiss (*Z. scabiosae* ssp. *schmidti* Reiss, cotype ♂).

Fig. 27. *Z. filipendulae* L. ssp. *calxensis* Le Charles, paratype ♂.

Fig. 28. *Z. filipendulae* L. ssp. *ciscaucasica* Shelj., cotype ♂.

Fig. 29. *Z. filipendulae* L. ssp. *wojtusiaki* Holik, cotype ♀.

Fig. 30. *Z. lonicerae* Schev. ssp. *deludens* Koch, paratype ♀.

Fig. 31. *Z. lonicerae* Schev. ssp. *transferens* Vrty. ab. *miniata* Tutt, type ♂.

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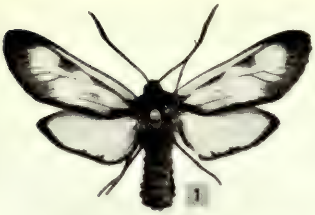
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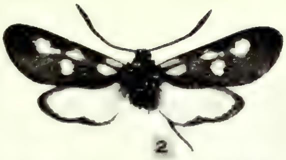
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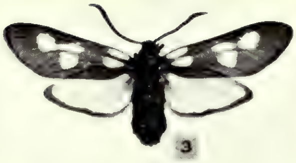
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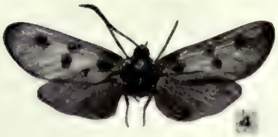
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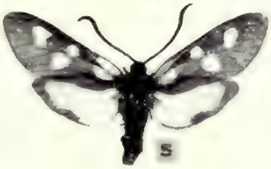
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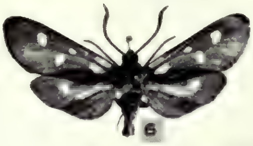
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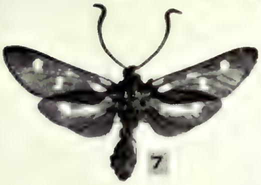
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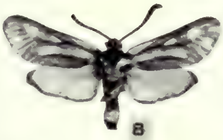
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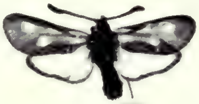
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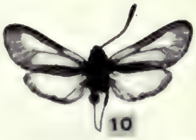
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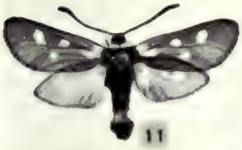
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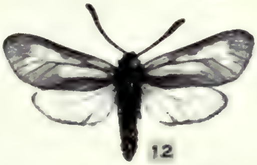
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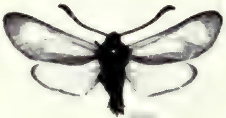
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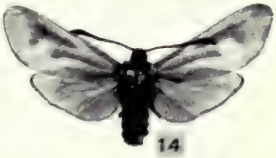
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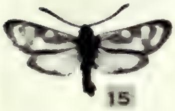
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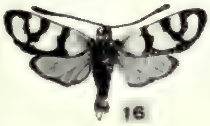
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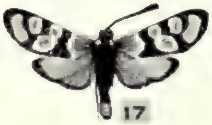
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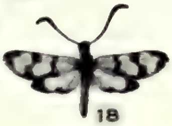
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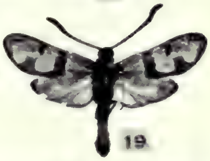
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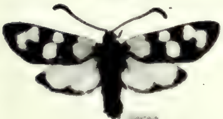
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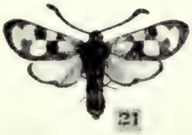
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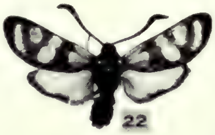
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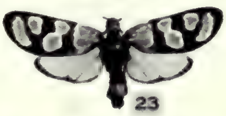
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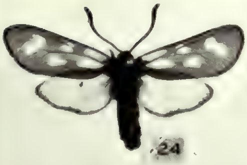
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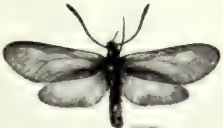
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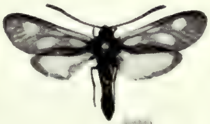
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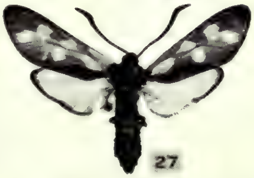
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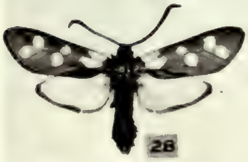
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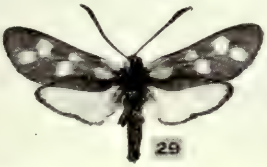
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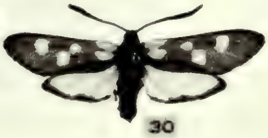
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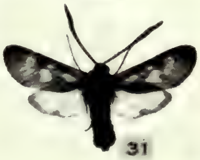
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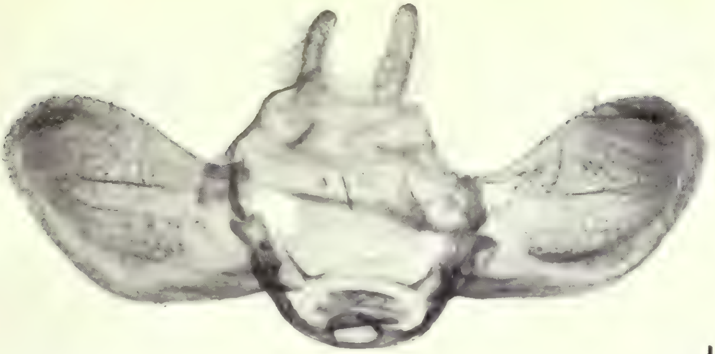
PLATE 58

Fig. 1. *Zygaena corsica* Boisd., lectotype ♂, genitalia.
Fig. 2. *Z. corsica* Boisd., lectotype ♂, aedeagus.
Fig. 3. *Z. loyselis* Obthr., lectotype ♂, genitalia.
Fig. 4. *Z. loyselis* Obthr., lectotype ♂, aedeagus.
Fig. 5. *Z. contaminei* Boisd., lectotype ♂, genitalia.
Fig. 6. *Z. contaminei* Boisd., lectotype ♂, aedeagus.



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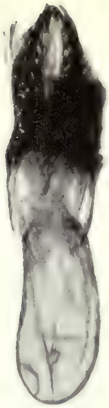

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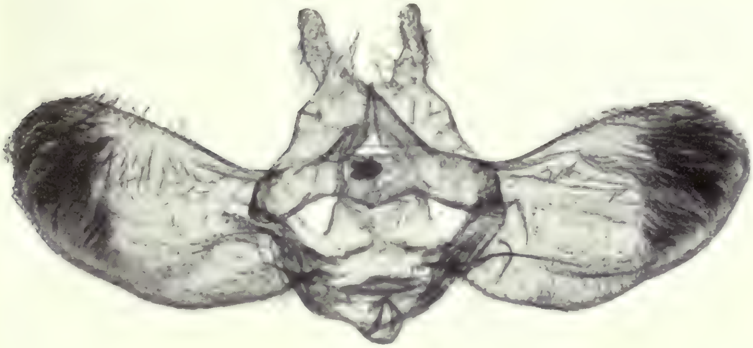

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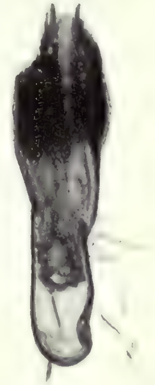

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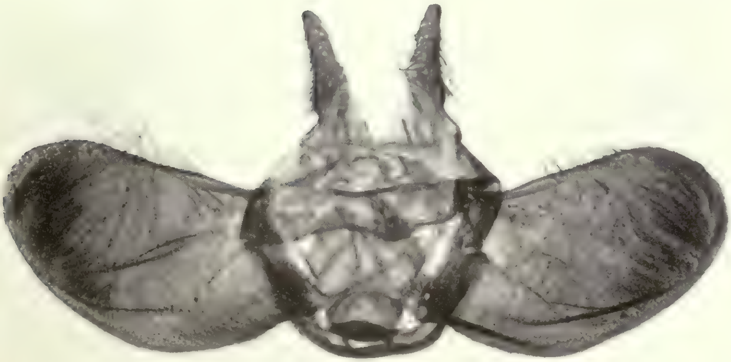

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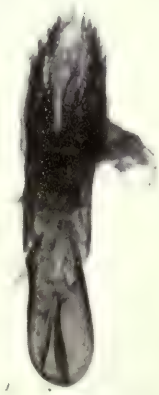

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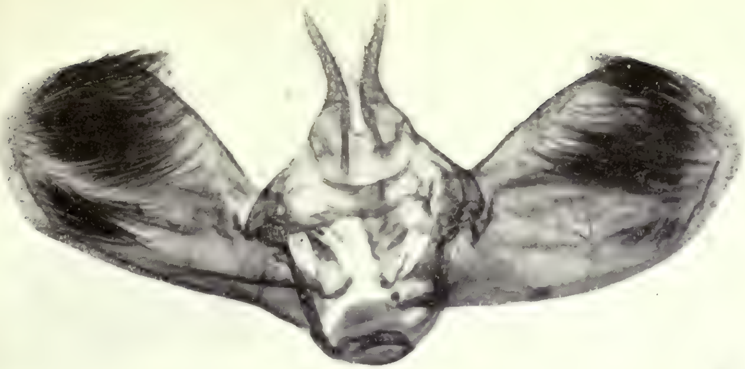
PLATE 59

FIG. 1. *Zygaena rothschildi* Reiss, type ♂, genitalia.
FIG. 2. *Z. rothschildi* Reiss, type ♂, aedeagus.
FIG. 3. *Z. felix* Obthr., neotype ♂, genitalia.
FIG. 4. *Z. felix* Obthr., neotype ♂, aedeagus.
FIG. 5. *Z. excelsa* Roths., type ♂, genitalia.
FIG. 6. *Z. excelsa* Roths., type ♂, aedeagus.



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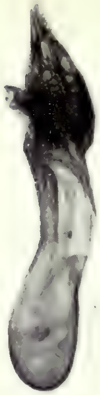

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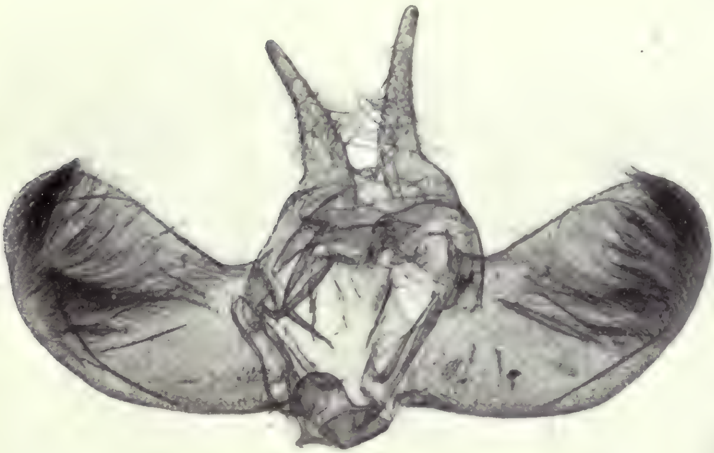

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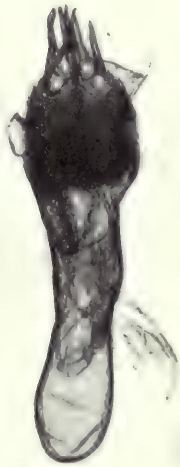

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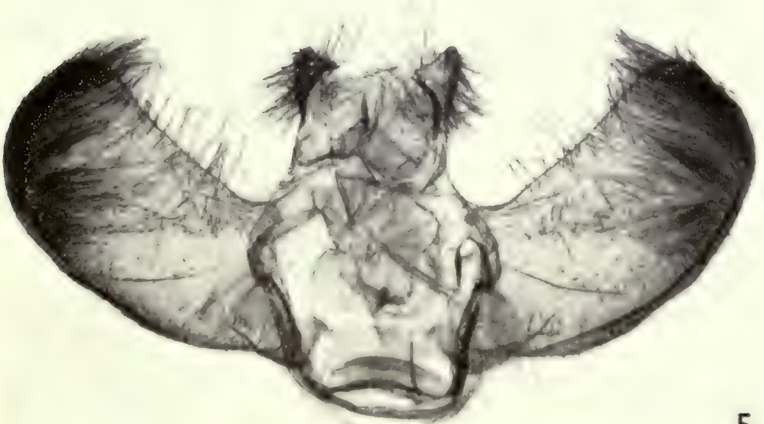

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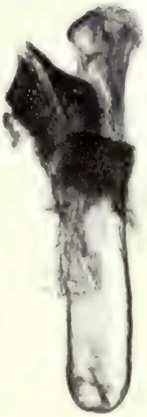

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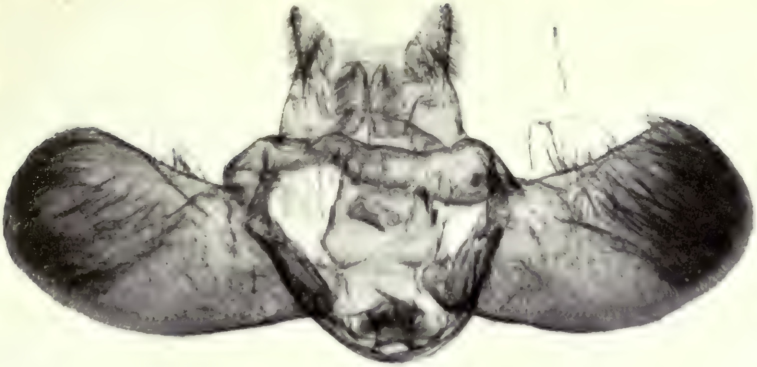
PLATE 60

FIG. 1. *Zygaena marcuna* Obthr., lectotype ♂, genitalia.
FIG. 2. *Z. marcuna* Obthr., lectotype ♂, aedeagus.
FIG. 3. *Z. alluaudi* Obthr., lectotype ♂, genitalia.
FIG. 4. *Z. alluaudi* Obthr., lectotype ♂, aedeagus.
FIG. 5. *Z. algira* Dup. (*Z. Bachagha* Obthr., ♂), genitalia.
FIG. 6. *Z. algira* Dup. (*Z. Bachagha* Obthr., ♂), aedeagus.



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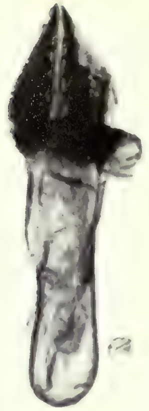

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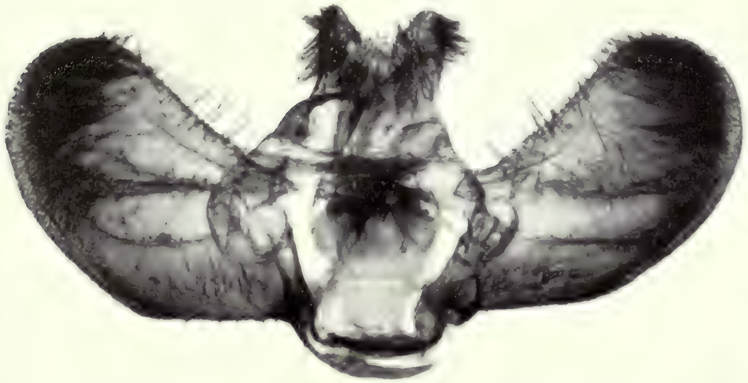

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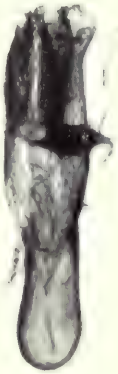

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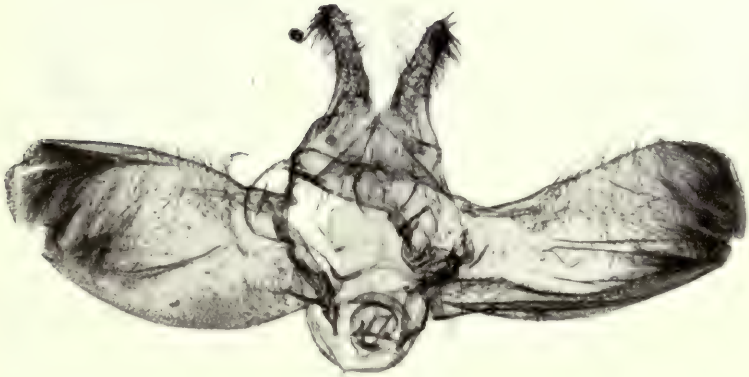

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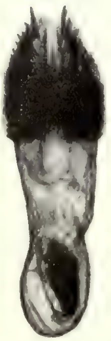

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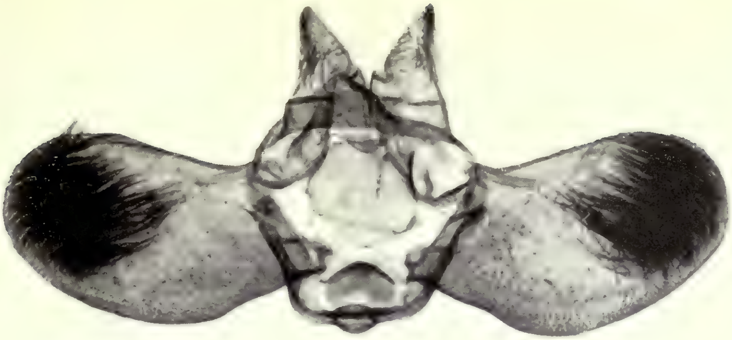
PLATE 61

Fig. 1. *Zygaena youngi* Roths., type ♂, genitalia.
Fig. 2. *Z. youngi* Roths., type ♂, aedeagus.
Fig. 3. *Z. harterti* Roths., type ♂, genitalia.
Fig. 4. *Z. harterti* Roths., type ♂, aedeagus.
Fig. 5. *Z. anthyllidis* Boisd., lectotype ♂, genitalia.
Fig. 6. *Z. anthyllidis* Boisd., lectotype ♂, aedeagus.



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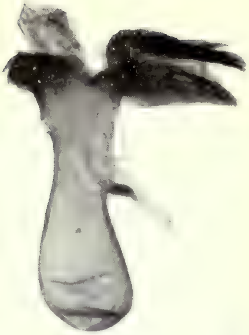

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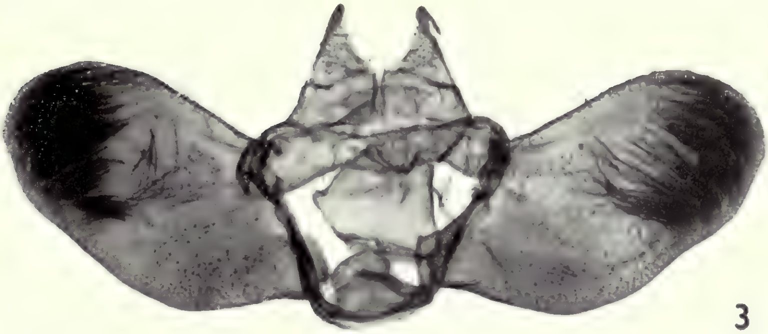

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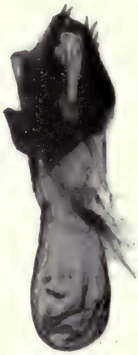

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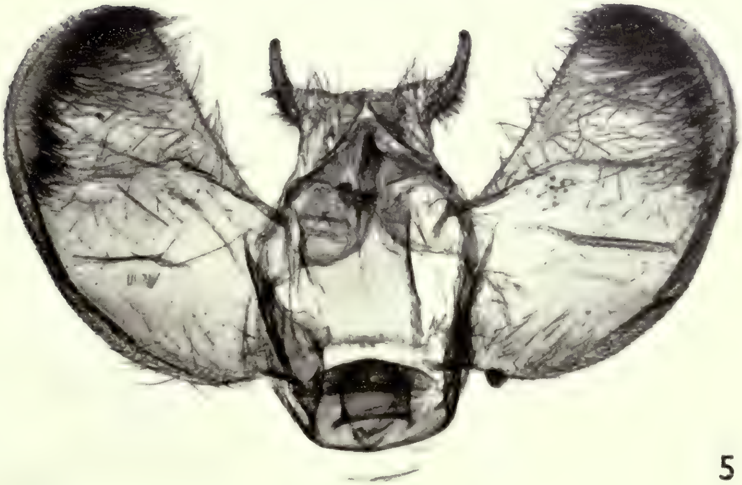

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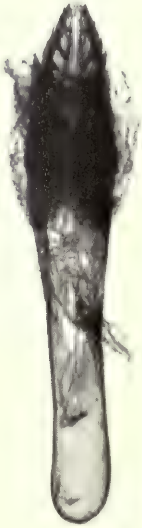

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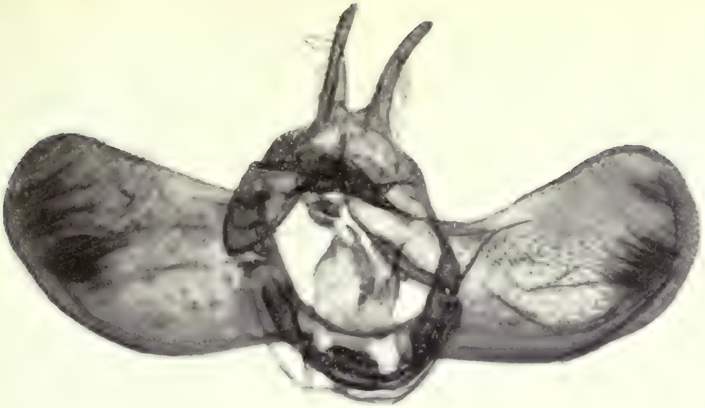
PLATE 62

Fig. 1. *Zygaena oxytropis* Boisd., type ♂, genitalia.
Fig. 2. *Z. oxytropis* Boisd., type ♂, aedeagus.
Fig. 3. *Z. theryi* de Joannis (*Z. lavandulae nisseni* Roths., type ♂, genitalia).
Fig. 4. *Z. theryi* de Joannis (*Z. lavandulae nisseni* Roths., type ♂, aedeagus).
Fig. 5. *Z. niphona* Butler, type ♂, genitalia.
Fig. 6. *Z. niphona* Butler, type ♂, aedeagus.



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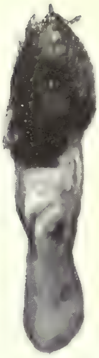

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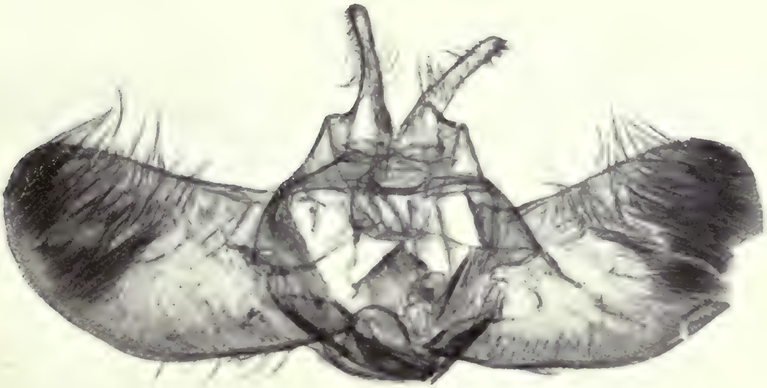

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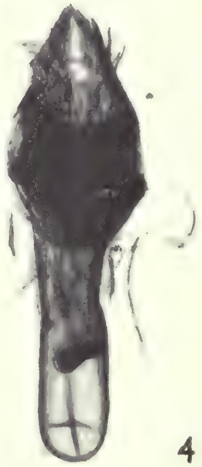

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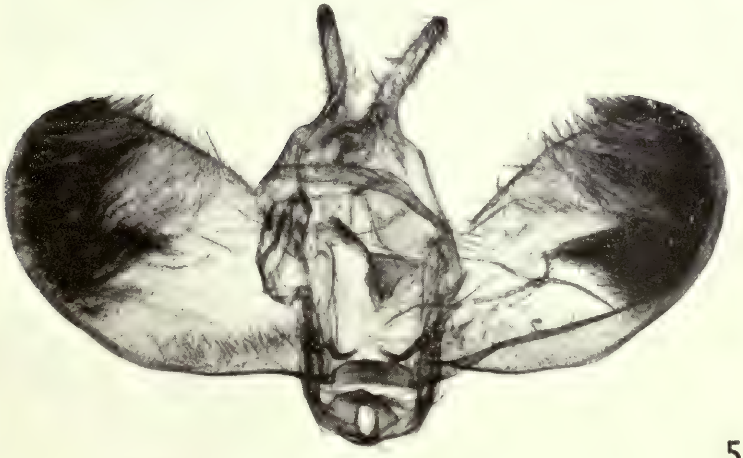

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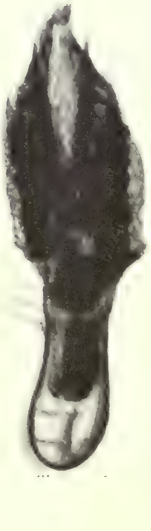

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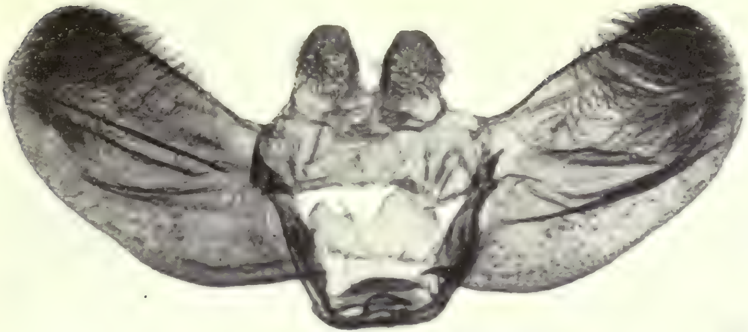
PLATE 63

Fig. 1. *Zygaena gallica* Obthr., lectotype ♂, genitalia.
Fig. 2. *Z. gallica* Obthr., lectotype ♂, aedeagus.
Fig. 3. *Z. dalmatina* Boisd., type ♂, genitalia.
Fig. 4. *Z. dalmatina* Boisd., type ♂, aedeagus.
Fig. 5. *Z. viciae* S. & D. ssp. *dahurica* Boisd. (*Z. dahurica* Boisd., type ♂, genitalia).
Fig. 6. *Z. viciae* S. &. D. ssp. *dahurica* Boisd. (*Z. dahurica* Boisd., type ♂, aedeagus).



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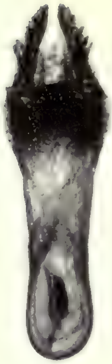

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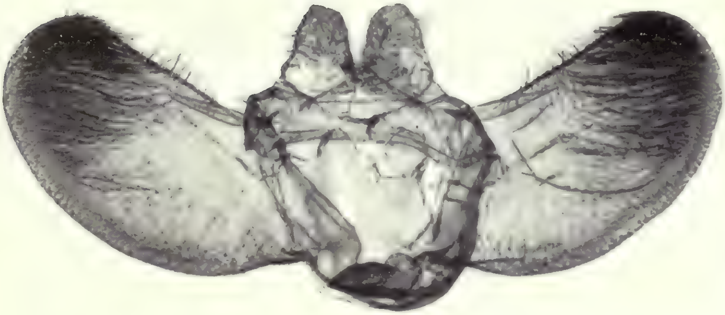

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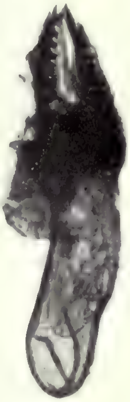

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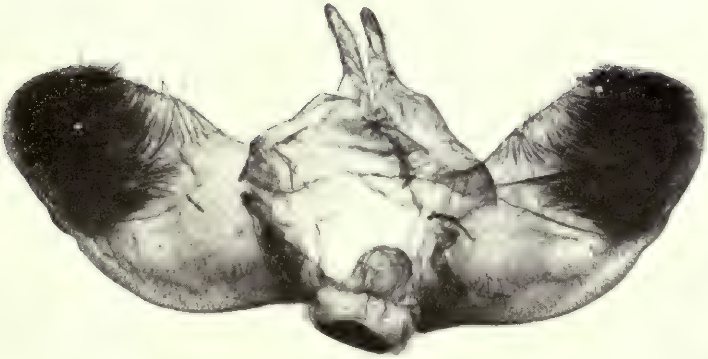

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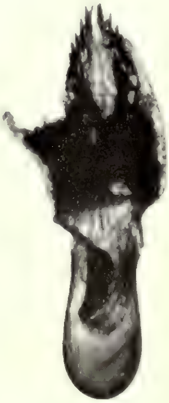

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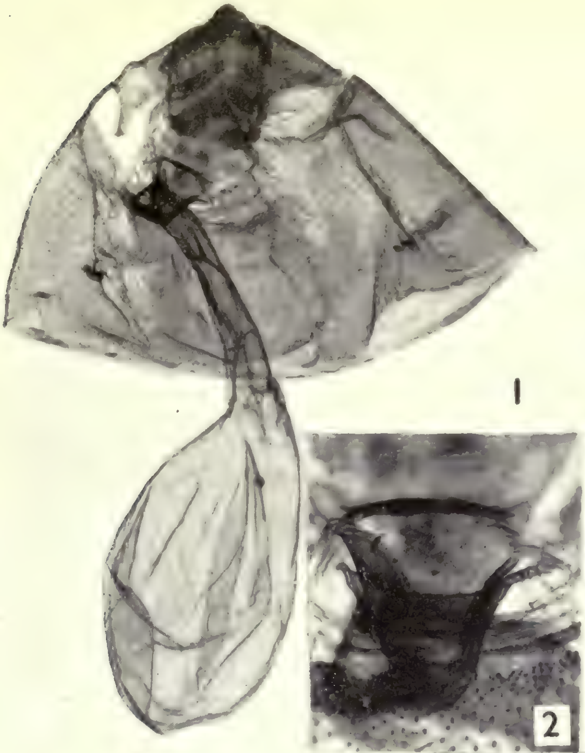
PLATE 64

FIG. 1. *Zygaena rubricollis* Hamps., type ♀, genitalia.
FIG. 2. *Z. rubricollis* Hamps., type ♀, ostium.
FIG. 3. *Z. olivieri* Boisd., lectotype ♀, genitalia.
FIG. 4. *Z. olivieri* Boisd., lectotype ♀, ostium.
FIG. 5. *Z. afghana* Moore, type ♀, genitalia.
FIG. 6. *Z. afghana* Moore, type ♀, ostium.
FIG. 7. *Z. maroccana* Roths., type ♀, ostium.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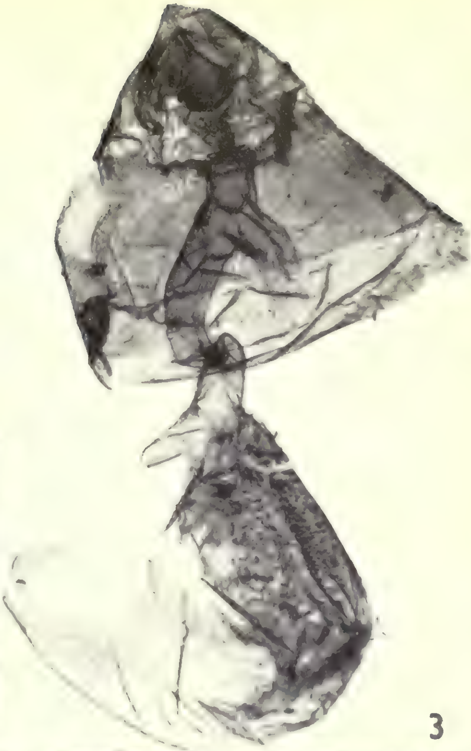
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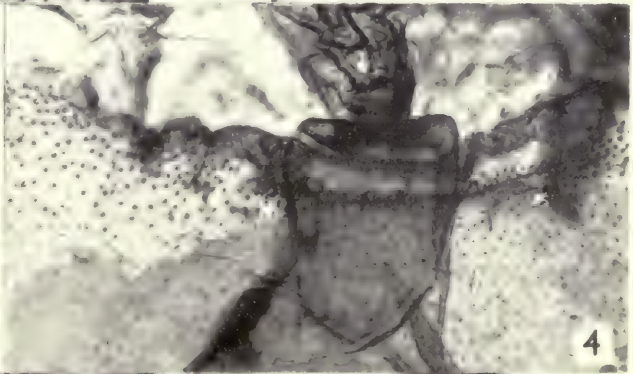
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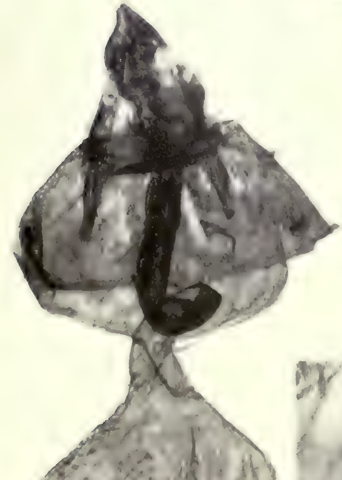
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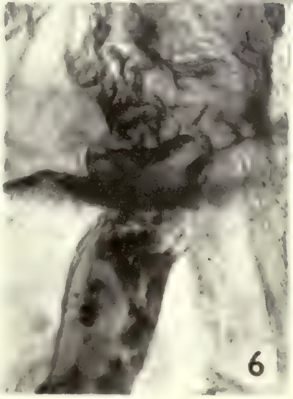
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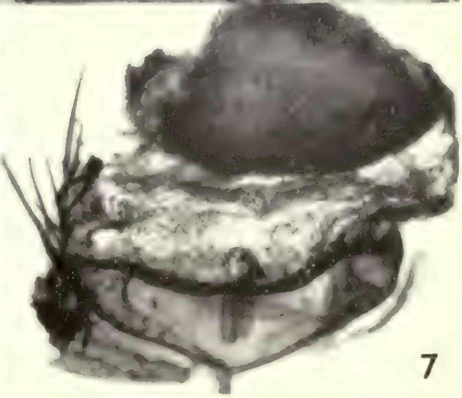
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A TAXONOMIC STUDY OF SOME INDO-AUSTRALIAN DREPANIDAE (LEPIDOPTERA)

ALLAN WATSON

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BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Vol. 10 No. 8
LONDON: 1961

A TAXONOMIC STUDY OF SOME INDO-AUSTRALIAN DREPANIDAE (LEPIDOPTERA)

BRITISH MUSEUM
12 APR 1961
NATURAL HISTORY

BY

ALLAN WATSON x-lf.
British Museum (Natural History)

Pp. 315–348 ; *Plates* 65–66 ; 69 *Text-figures*

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A TAXONOMIC STUDY OF SOME INDO-AUSTRALIAN DREPANIDAE (LEPIDOPTERA)

By ALLAN WATSON

INCLUDED in this paper are descriptions of five new species and five new subspecies. The three new, apparently endemic species from Celebes are of special interest. The affinities of these species and other Drepanidae from Celebes, some of which are of Austro-Malayan and others of Indo-Chinese origin, show that in this family as in most other groups of animals Celebes forms part of a broad zoogeographical zone (the " Wallacea " of Dickerson (1928) and subsequent authors) intermediate between the above Sub-regions.

A brief account of the interesting distribution of *Oreta griseotincta* Hampson and *Oreta carnea* (Butler) and the presence of polymorphism in *Psiloreta obtusa* (Walker) is given under the appropriate species.

The type specimens (where still in existence) of all the taxa mentioned in the text have been examined : they are in the British Museum (Nat. Hist.) unless otherwise stated.

Apart from the text-figures of the genitalia of the new species and subspecies it has been found necessary for purposes of comparison to figure, for the first time, the male or female genitalia of the following taxa : *Drapetodes magnifica magnifica* Swinhoe (♀), *Callidrepana vanbraeckeli* Gaede (♂♀), *Tridrepana flava unita* Watson (♀), *Oreta singapura singapura* Swinhoe (♂), *Oreta singapura continua* Warren (♂), *Oreta extensa* Walker (♂♀), *Oreta carnea* (Butler) (♂♀), *Psiloreta obtusa obtusa* (Walker) (♂), *Psiloreta obtusa speciosa* (Bryk) (♂), *Psiloreta obtusa aequitermen* Warren (♂). The text-figures of the genitalia are of a ventral view. A millimetre scale is placed by each drawing or group of drawings : the figures of the male genitalia of any taxon are to the same scale.

The measurements are recorded as follows : (*a*) mean wing-span (twice the distance between the apex and the centre of the mesothorax) ; (*b*) range of the measurements of the wing-span ; (*c*) number of specimens measured.

I was able to borrow material from the following institutions : Rijkmuseum van Natuurlijke Historie, Leiden ; Landbouwhogeschool te Wageningen ; Zoological Museum, Amsterdam ; Zoologisches Museum der Humboldt Universität, Berlin ; Deutsches Entomologisches Institut, Berlin-Friedrichshagen ; Museum Alexander Koenig, Bonn ; Naturhistorisches Museum, Vienna ; Senckenbergische Naturforschende Gesellschaft, Frankfurt am Main ; Naturhistoriska Riksmuseum, Stockholm; Institut Royal des Sciences Naturelles de Belgique, Brussels.

I am very grateful to Dr. A. Diakonoff and to Prof. W. Roepke who kindly sent a large collection of material from the Dutch museums and also to Dr. A. Collart, Dr. Elli Franz, Dr. G. Friese, Dr. H. Hannemann, Dr. B. Hanson, Dr. H. Höne and Dr. R. Schönmann who arranged other valuable loans.

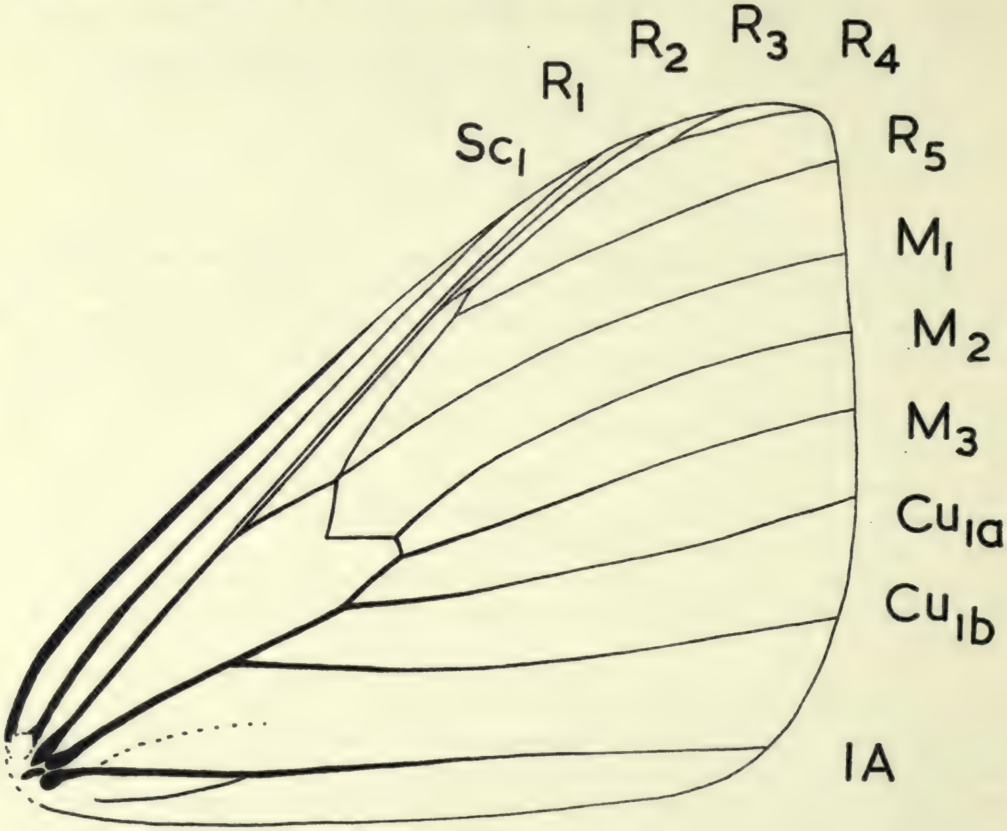

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Fig. 1. *Teldenia latilinea* sp. n., fore wing venation.

Teldenia latilinea sp. n.

Type. Holotype male, W. Celebes, Paloe, Lindoe, 3,700 ft., April, 1937 (J. P. A. Kalis) ; Drepanidae genitalia slide No. 858.

This species is probably most closely related to *T. nigrinotata* Warren which has similar male genitalia. It is readily distinguished from the latter species and from the other two species occurring in Celebes, *T. angustifascia* Watson and *T. niveata* (Pagenstecher), (see plates), by the pattern and form of the wing markings and by the male genitalia.

MALE (Pl. 65, fig. 1). 21·2, 20·2–22·8 mm. (10). Head dark reddish brown, but white towards labrum ; collar white. Upper surface of antennal shaft white basad, pale brown distad ; longest antennal pectination equal to three-quarters greatest diameter of eye. Palp white, irrorated with dark brown on outer surface.

Thorax white. Fore wing venation as in Text-fig. 1. Ground colour of both surfaces of both wings moderately lustrous, white, but costa of fore wing reddish brown at base and costal area on underside brown basad. Colour pattern of upperside as in plate ; markings brown or dark brown ; postmedial broad, diffusely marked. Underside unmarked. Legs white except for brown front surface of foreleg.

Abdomen white.

Male genitalia as in Text-figs. 2–4.

FEMALE. 24·3, 22·6–25·0 mm. (15). Similar to male, but antenna weakly serrate, ciliate.

Female genitalia as in Text-fig. 5.

MATERIAL EXAMINED. (It is worth noting that a much greater number of females than males seems to have been collected.) *British Museum* (*Nat. Hist.*). W. CELEBES : 2 ♂ and 12 ♀ paratypes, Paloe, G. Tompoe, 2,700 ft., Jan., Feb., 1937 (J. P. A. Kalis) ; 3 ♂ and 9 ♀ paratypes, Paloe, Lindoe, 3,700 ft., April, 1937 (J. P. A. Kalis) ; 3 ♂ and 5 ♀ paratypes, Paloe, G. Rangkoenau, 1,800 ft., Nov., Dec., 1936 (J. P. A. Kalis) ; 3 ♂ and 18 ♀ paratypes, Paloe, Loda, 4,000 ft., May, 1937 (J. P. A. Kalis) ; 4 ♂ and 24 ♀ paratypes, Paloe, Sidaonta, 4,500 ft., Jan., 1937 (J. P. A. Kalis) ; 7 ♀ paratypes, Paloe, Koelawi, 3,100 ft., March, 1937 (J. P. A. Kalis). SW. CELEBES : 1 ♀ paratype, Parang-bobo Goa, G. Lampobattang, 5,000 ft., May, 1938, March, 1938 (J. P. A. Kalis). E. CELEBES : 3 ♂ and 4 ♀ paratypes, Ulu Kolaka, 500 m., v–vi.1939 (J. P. A. Kalis).

A female in the British Museum collection from N. Celebes, Tondano, Ramboekers (Weigall), probably belongs to this species.

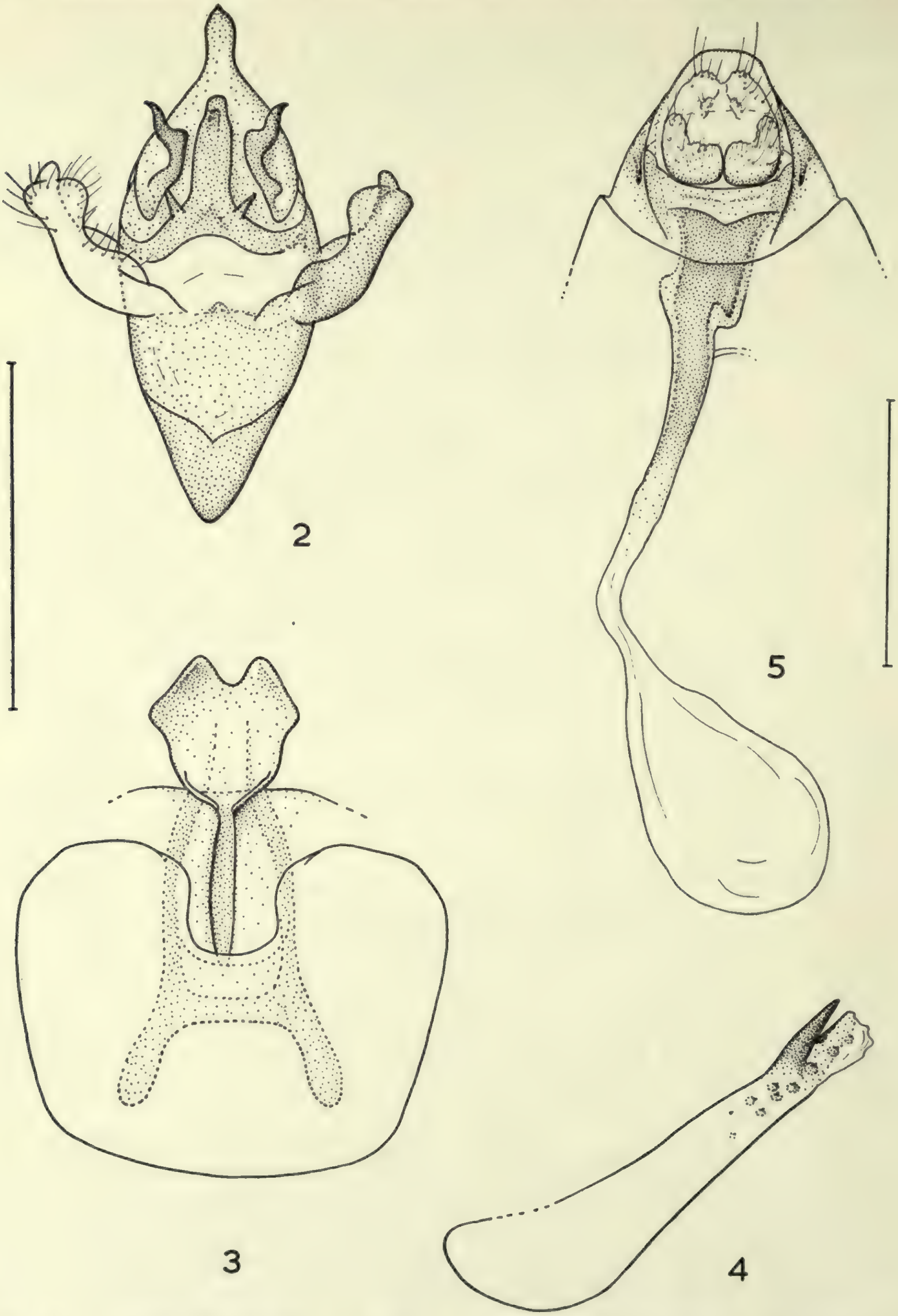
Teldenia angustifascia sp. n.

TYPE. Holotype male, W. Celebes, Paloe, G. Tompoe, 2,700 ft., Feb., 1937 (J. P. A. Kalis) ; Drepanidae genitalia slide No. 859.

This species is readily separated from the rest of the genus by the colour-pattern. The fact that vein R_1 of the fore wing arises from the areole and not from the cell, together with certain similarities in the male genitalia, suggest that *T. illunata* Warren is its closest relative.

MALE (Pl. 1, fig. 3). 25·5, 24·0–26·4 mm. (10). Head dark reddish brown, but white towards labrum ; collar white. Palp white, irrorated on outer surface with dark brown. Upper surface of antenna white basad, brown distad ; longest antennal pectination equal to about three-quarters greatest diameter of eye.

Thorax white. Fore wing venation as in Text-fig. 6. Ground colour of both surfaces of both wings slightly lustrous, white. Costa of fore wing reddish brown dorsally, except at apex, and dark brown at base on underside. Colour pattern of upperside as in plate : terminal spots very dark reddish brown, remaining markings



FIGS. 2–5. *Teldenia latilinea* sp. n. Male : 2, genitalia ; 3, eight sternum and tergum ; 4, aedeagus. 5, Female genitalia.

reddish brown; position of postmedial fascia diagnostic. Underside unmarked. Legs white except for brown front surface of foreleg.

Abdomen white.

Male genitalia as in Text-figs. 8–10.

FEMALE. 28·1, 26·8–29·6 mm. (7). Similar to male but antenna ciliate and weakly serrate, not bipectinate. Female genitalia as in Text-fig. 7.

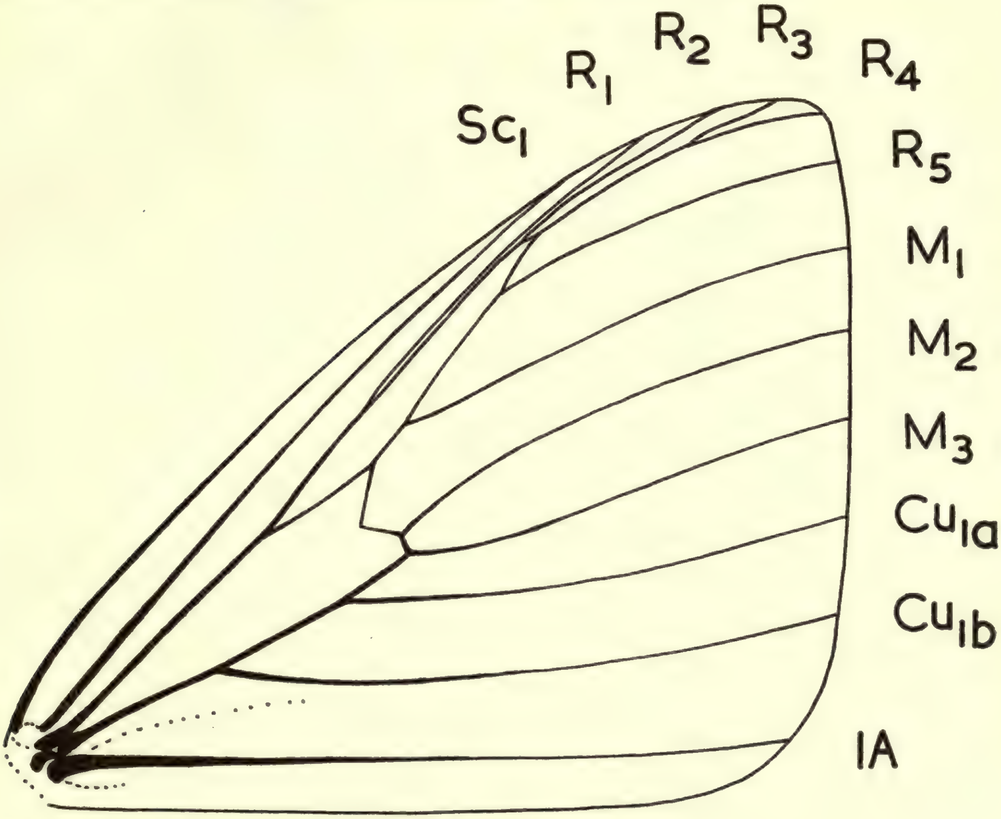


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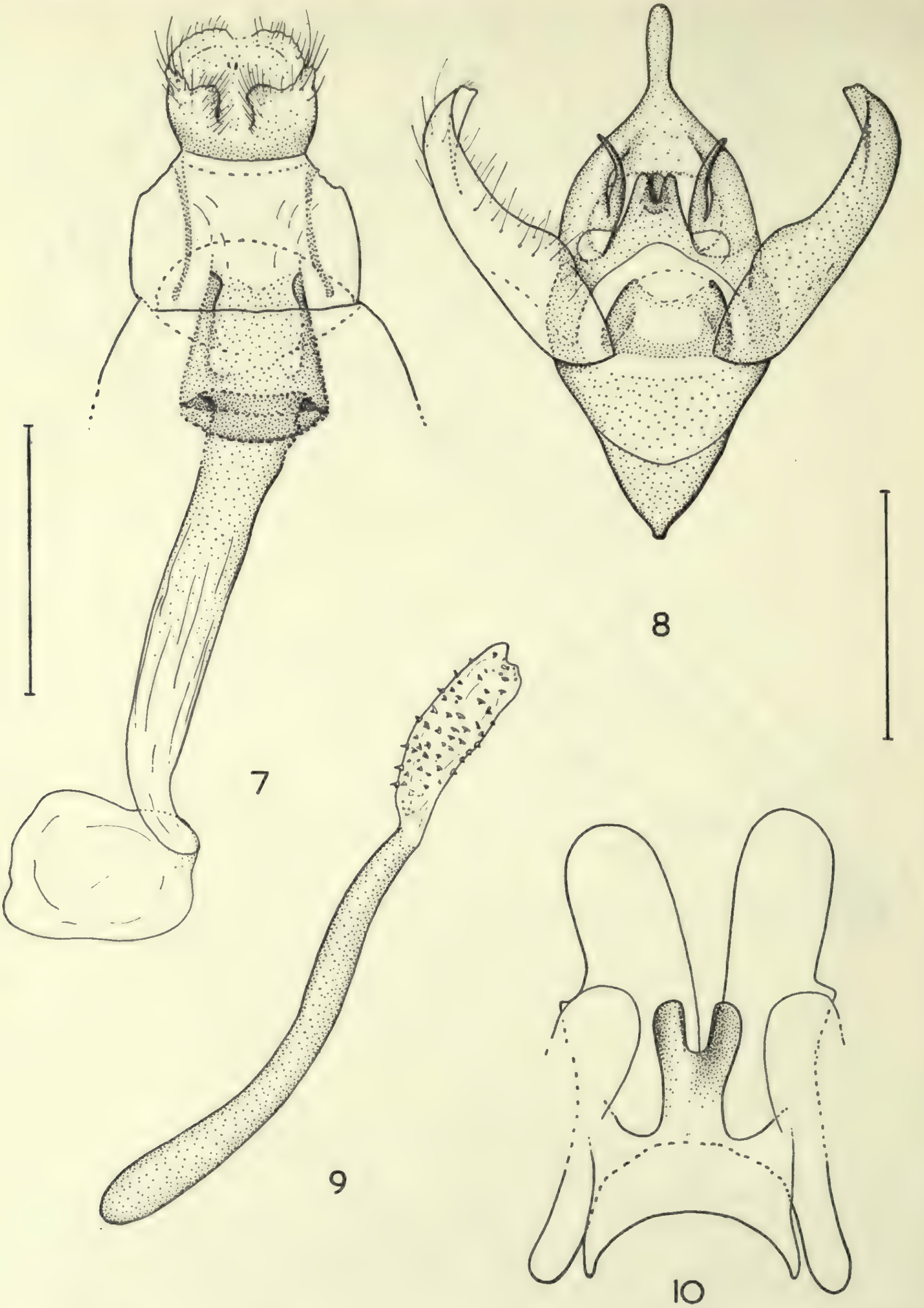
FIG. 6. *Teldenia angustifascia* sp. n., fore wing venation.

MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). W. CELEBES: ♂ holotype, 4 ♂ paratypes and 1 ♀ paratype, Paloe, G. Tompoe, 2,700 ft., Feb., 1937 (J. P. A. Kalis); 1 ♀ paratype, Paloe, Koelawi, 3,100ft., March, 1937 (J. P. A. Kalis); 1 ♂ and 1 ♀ paratype, Paloe, Loda, 4,000 ft., May, 1937 (J. P. A. Kalis); 3 ♂ and 7 ♀ paratypes, Paloe, Lindoe, 3,700 ft., April, 1937 (J. P. A. Kalis). N. CELEBES: 2 ♂ and 1 ♀ paratypes, Minahassa, Tomohon, vi, vii.1954 (A. H. G. Alston). E. CELEBES:



Figs. 7–10. *Teldenia angustifascia* sp. n. 7, female genitalia. Male : 8, genitalia ; 9, aedeagus; 10, eighth sternum and tergum.

2 ♂ and 2 ♀ paratypes, Ulu Kolaka, 500 m., v–vi.1939 (Kalis). *Natural History Museum, Leiden.* N. CELEBES : 3 ♂ paratypes, Minahassa, 1921 (P. J. v. d. Bergh, Lzn.). *Zoological Museum, Humboldt University, Berlin.* N. CELEBES : 1 ♂ paratype, Minahassa.

Drapetodes magnifica Swinhoe

Drapetodes magnifica Swinhoe, 1902, *Trans. ent. Soc. Lond.* **1902** : 589.
Drapetodes magnifica Swinhoe, Warren *in* Seitz, 1922, *Gross-Schmett. Erde*, **10** : 410.
Drapetodes Swinhoe, Gaede, 1931, *Lepid. Cat.* **49** : 15.

TYPE. Holotype ♀, Singapore ; Drepanidae genitalia slide No. 880.

The colour pattern of this species readily distinguishes it from the rest of the genus (see plate of *denotata* ssp. n.). The genitalia are figured in Text-figs. 11–14.

DISTRIBUTION. The nominate subspecies is known to occur in Singapore, Malaya and W. Java. The subspecies *denotata* ssp. n. may be restricted to Borneo.

Drapetodes magnifica denotata ssp. n.

TYPE. Holotype, ♂. Borneo, Kariorang, 21.iii.1927 (Qu. de Quarles); Drepanidae genitalia slide No. 878.

Similar to the nominate subspecies but with more clearly marked, white basal fascia on hind wing (see Pl. 65, fig. 4) and with several significant differences in the male and female genitalia (see Text-figs. 15–18).

DISTRIBUTION. East Borneo.

MATERIAL EXAMINED. *Landbouwhogeschool, Wageningen.* E. BORNEO : holotype ♂ ; allotype ♀ from type locality, 7.ii.1927.

Tridrepana fulvata celebica spp. n.

TYPE. Holotype male, W. Celebes, Paloe, G. Tompoe, 2,700 ft., Jan., 1937 (J. P. A. Kalis) ; Drepanidae genitalia slide No. 317.

MALE. 35·9, 34·8–37·4 mm. (5). (Text-fig. 19.) Apparently indistinguishable externally from the nominate subspecies and *T. fulvata brevis* Watson. In the male genitalia the anellus is much broader at the base than in the nominate subspecies. (See Watson, 1957.)

All the specimens examined belong to the yellow form of the species.

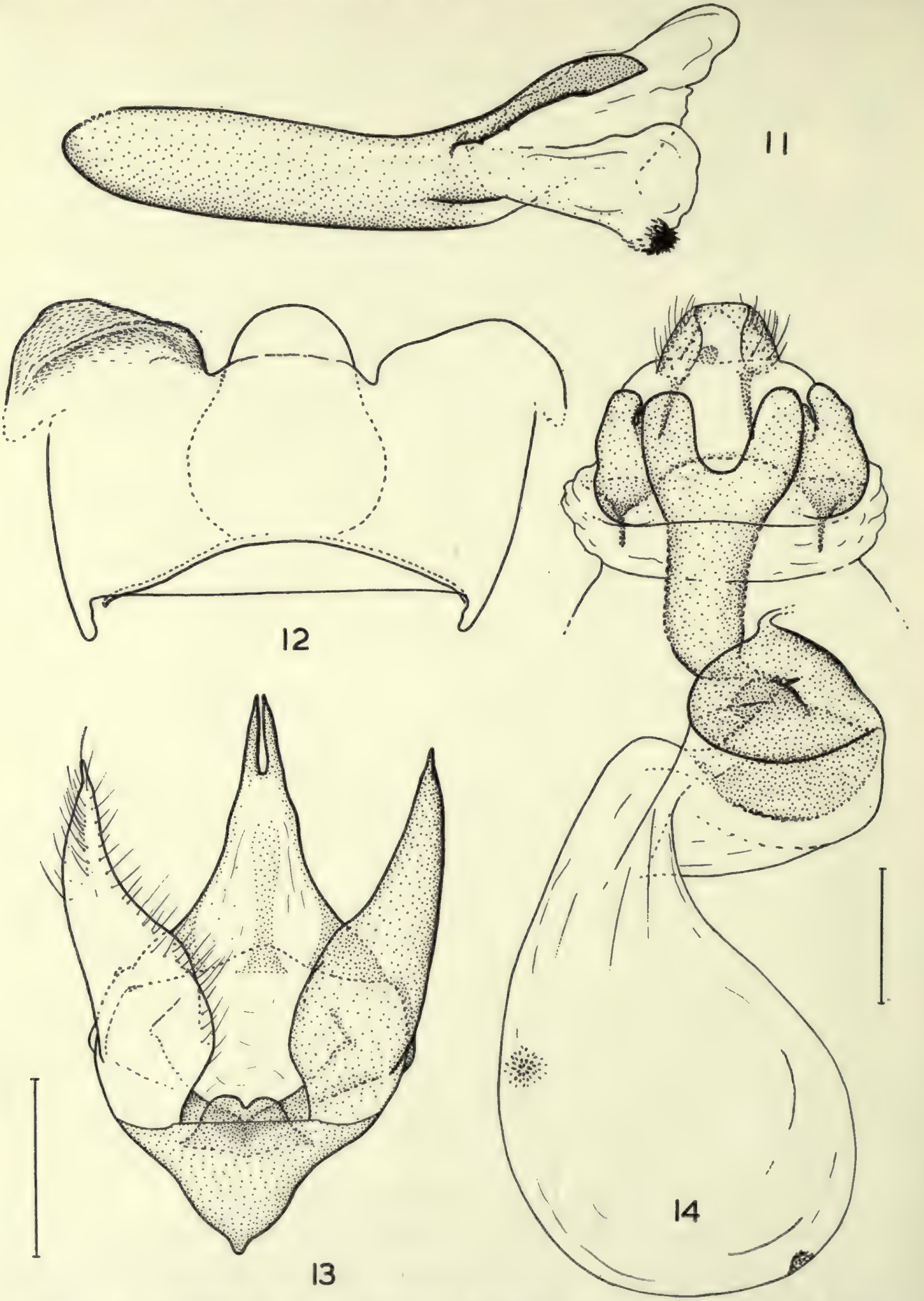
MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). W. CELEBES : ♂ holotype ; 1♂ paratype, Koelawi Paloe, March, 1937 (J. P. A. Kalis). *Zoological Museum, Amsterdam.* NE. CELEBES : 1 ♂ paratype, Minahassa, 1920 ; 1 ♂ paratype, Bolang Mongondow. *Institut Royal des Sciences Naturelles, Brussels.* NE. CELEBES : 1 ♂ paratype, Tonsea Lama, 12 May (van Braeckel).

Tridrepana flava unita Watson

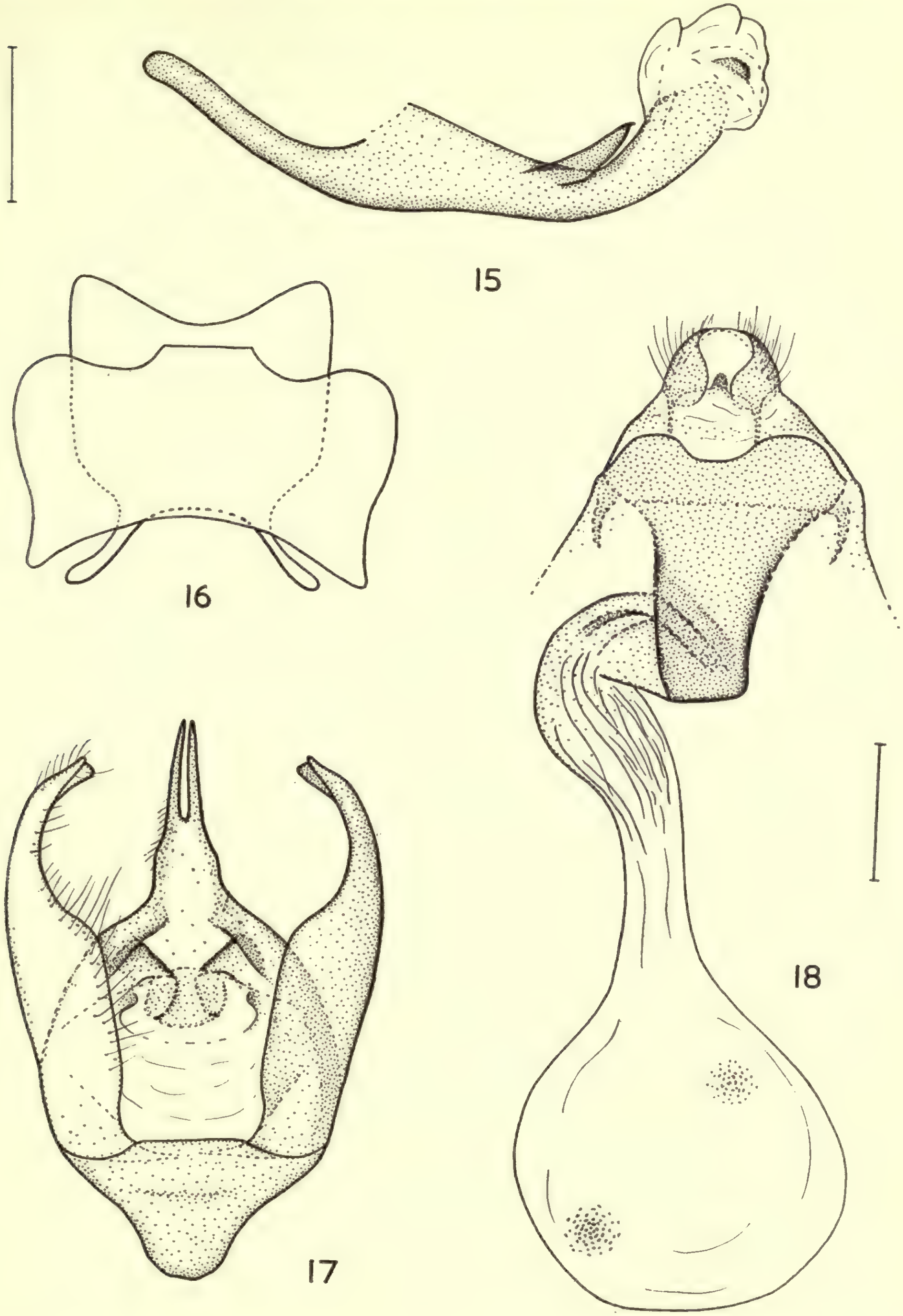
Tridrepana flava unita Watson, 1957, *Bull. Brit. Mus.* (*nat. Hist.*) *Ent.* **4** : 496.

TYPE. Holotype male, N. Celebes, Minahassa, 1922, Coll. P. J. v. d. Bergh, Lzn.

I have been sent recently five females of this subspecies which at the time of my



FIGS. 11–14. *Drapetodes magnifica magnifica* Swinhoe. Male : 11, aedeagus ; 12, eighth sternum and tergum ; 13, genitalia. 14, Female genitalia.



Figs. 15–18. *Drapetodes magnifica denotata* ssp. n. Male: 15, aedeagus, 16, eighth sternum and tergum; 17, genitalia. 18, Female genitalia.

revision of *Tridrepana* Swinhoe (Watson, 1957) was known only from two males. A third male has also been examined and found to belong to this subspecies.

FEMALE. 57·6, 56·2–58·2 mm. (4). Similar to male but with longest antennal pectination equal to three-quarters greatest diameter of eye. Genitalia similar to those of *T. flava contracta* Watson (see Watson, *loc. cit.*, fig. 149). (The last two lines of the description of *T. flava contracta* Watson, see Watson, *loc. cit.* p. 495, should read: "Female (Text-fig.149). Dorsal ovipositor lobes separated by a shallower emargination; each lobe less elongate.")

MATERIAL EXAMINED. *Zoological Museum, Amsterdam.* N. CELEBES: 3 ♀, Minahassa, 1920 and 1 ♀ Bol. Mon, 1921 (Coll. P. J. v. d. Bergh, Lzn.). *Institut Royal des Sciences Naturelles, Brussels.* N. CELEBES: 1 ♀, Menado (van Braeckel); 1 ♂ Menado (van Braeckel).

Albara vinacea (Moore)

Drepana vinacea Moore, 1879, Descr. New Indian Lep. Coll. Atkinson, p. 85.

Albara vinacea (Moore), Warren *in* Seitz, *Gross-Schmett. Erde*, **10**: 468, pl. 49h. (Good colour-illustration.)

Albara vinacea (Moore) Gaede, 1931, *Lepid. Cat.* **49**: 33.

Albara birmanica Bryk, 1943, *Ark. Zool.* **34**A No. 13: 18, pl. 2, fig. A6. (Good half-tone illustration.) ***Syn. nov.***

TYPE. I select as lectotype a male specimen in the collection of the British Museum (Nat. Hist.) bearing the following data: "Darjeeling 1864"; "Drepana vinacea Moore" (the latter in Moore's handwriting on the reverse of the locality label); "Moore Coll. 94–106"; "Drepanidae genitalia slide No. 724".

DISTRIBUTION. Sikkim and NE. India.

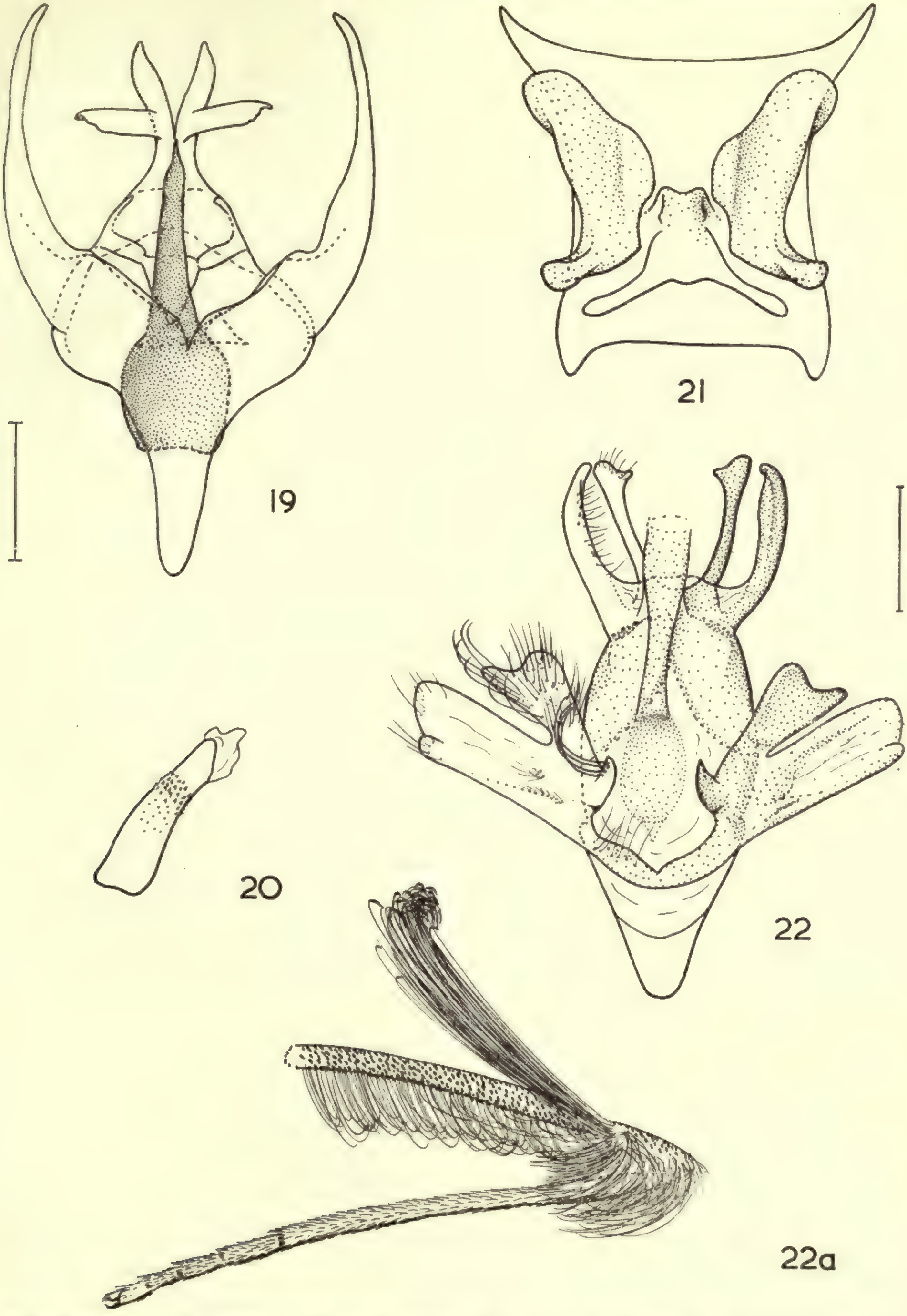
Albara fuscilinea sp. n.

TYPE. Holotype ♂, Malay Peninsula, Selangor, Bukit Kutu, 8,500 ft., 22.iii.1931 (H. M. Pendlebury); Drepanidae genitalia slide No. 891.

Differs from *Albara vinacea* (Moore) (see plates of *vinacea* mentioned above) in that the pale medial areas on both fore and hind wings are edged with dark scales and are therefore more prominent, and that on the underside of the hind wing there is a broad strongly marked, dark brown, postmedial fascia and a large dark brown patch at the posterodistal end of the cell extending towards the anal margin. The male genitalia are also quite different from those of *Albara vinacea* (Moore).

MALE. 41·9, 41·4–42·4 mm. (2). Head and antenna brown; head paler towards labrum; palps pale brown. Antennae bipectinate; longest pectination nearly as long as greatest diameter of eye.

Colour pattern of upperside as in figures of *A. vinacea* (Moore) in Seitz (*loc. cit.*) and Bryk (*loc. cit.*) but with pale medial patches edged with dark brown and more proximal postmedial line faintly marked. Underside of fore wing yellow; costa irrorated with brown basad; well-marked, dark brown discocellular spot, and smaller spot at posterodistal angle of cell; central part of postmedial fascia and arcuate subterminal fascia well marked and dark brown. Underside of hind wing



FIGS. 19–22*a*. (19) *Tridrepana fulvata celebica* ssp. n., male genitalia. (20–22*a*) *Albara fuscilinea* sp. n. Male: 20, aedeagus; 21, eighth sternum and tergum; 22, genitalia. 22*a*, Outer surface of prothoracic leg.

yellow, with discellular spot as in fore wing, and large dark brown patch at posterior angle of cell extending to Cu_{1b} or just posterior to this vein ; strongly marked, dark brown postmedial fascia, trace of subterminal fascia anteriad. Foreleg with remarkable vestiture (see Text-fig. 22*a*).

Colour of abdomen doubtful, probably similar in colour to adjacent part of hind wing.

Male genitalia as in Text-figs. 20–22.

FEMALE. Unknown.

DISTRIBUTION. Malaya. There is a female from Sumatra in the Entomological Laboratory at Wageningen which probably belongs to this species.

MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). MALAYA : ♂ holotype and 1 ♂ paratype, Selangor, Bukit Kutu, 8,500 ft., 11, 22.iii.1931 (H. M. Pendlebury) ; 1 ♂ paratype, Malay Peninsula.

Callidrepana vanbraeckeli Gaede

Callidrepana vanbraeckeli Gaede, 1934, *Bull. Mus. H. n. Belg.* **10** (No. 26) : 3.

TYPE. Holotype ♂, Tonsea Lama (NE. Celebes), 8 May (van Braeckel) ; Drepanidae genitalia slide No. 912. In the Institut Royal des Sciences Naturelles, Brussels.

This species is readily distinguished from *C. micacea* Walker, *C. biocularis* Moore and *C. discipunctata* Warren by the delicate colouring and the predominantly pale coloured postmedial fascia of both wings (see Pl. 65, fig. 5). The male genitalia also readily separate the species (see Text-figs. 23–24). The female genitalia are figured in Text-figure 25.

MATERIAL EXAMINED. *Institut Royal des Sciences Naturelles, Brussels.* N. CELEBES : ♂ holotype ; 1 ♀ from type locality, 10 May (van Braeckel). *British Museum* (*Nat. Hist.*). W. CELEBES : 2 ♂, 1 ♀, Paloe, Loda, 4,000 ft., May, 1937 (J. P. A. Kalis) ; 3 ♂ Paloe, Sidaonta, 4,500 ft., June, 1937 (J. P. A. Kalis) ; 8 ♂, Paloe, Koelawi, 3,100 ft., March, 1937 (J. P. A. Kalis) ; 1 ♂, 1 ♀, Paloe, G. Tompoe, 2,700 ft., Jan., 1937 (J. P. A. Kalis) ; 4 ♂, Paloe, Lindoe, 3,700 ft., Apr., 1937 (J. P. A. Kalis).

Six males from Malaya in the British Museum (Nat. Hist.), one male from Malaya in the Zoological Museum at Bonn and two males from Malaya in the Natural History Museum, Vienna, belong to this species but may represent a separate subspecies.

Campylopteryx fleximargo (Warren)

Drepana fleximargo Warren, 1896, *Novit. zool.* **3** : 272.

Campylopteryx fleximargo (Warren), Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 476 (rather inaccurate but useful colour-plate : the medial, hyaline area in the hind wing is not shown).

Campylopteryx fleximargo (Warren), Gaede, 1931, *Lepid. Cat.* **49** : 40.

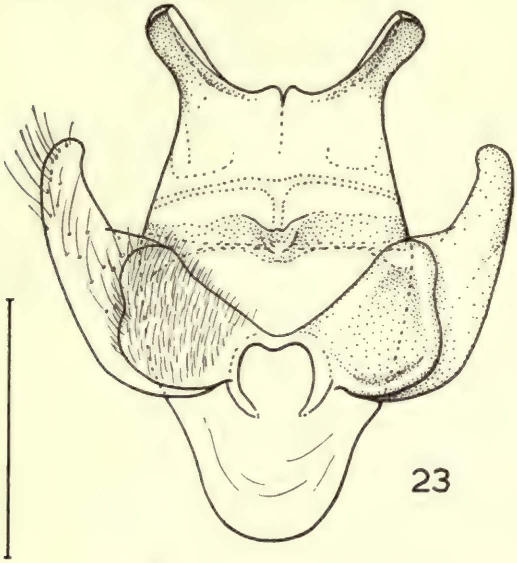
Campylopteryx sublignata Warren, 1902, *Novit. zool.* **9** : 340. Holotype ♂, Watubela Is., Kissoei (Kühn). ***Syn. nov.***

Campylopteryx sublignata Warren, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 476 (slightly inaccurate colour-plate).

Campylopteryx sublignata Warren, Gaede, 1931, *Lepid. Cat.* **49** : 40.

TYPE. Holotype ♂, Fergusson Is., xi.1894 (A. S. Meek).

I have compared the holotypes (including the genitalia) of *C. sublignata* Warren and *C. fleximargo* (Warren) and found them conspecific. The type of *C. sublignata* Warren is simply a rather small pale specimen of the species. There is an almost complete range of variation from pale grey to dark brown in the series of the British Museum (Nat. Hist.) collection.



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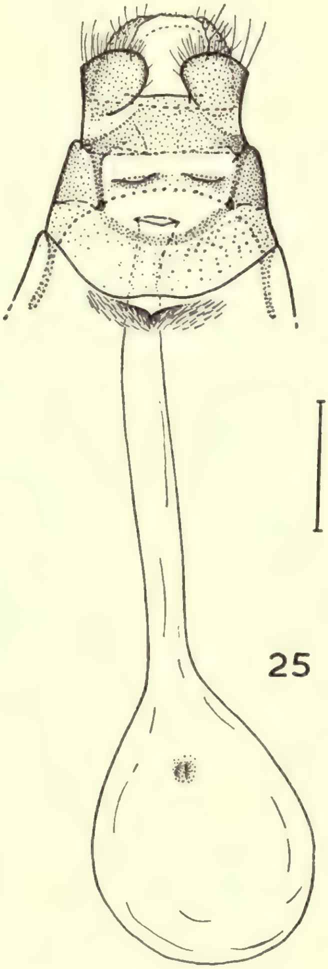

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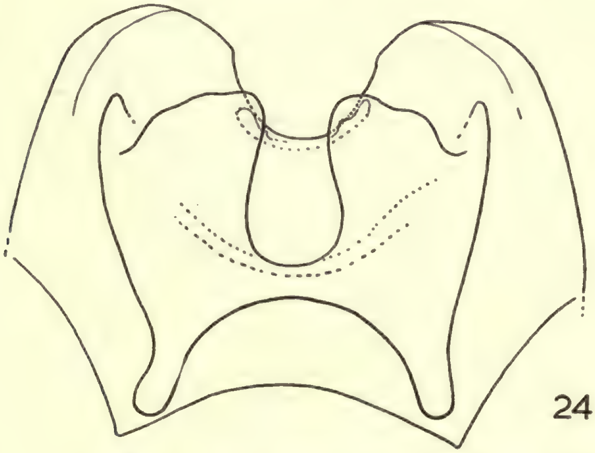

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FIGS. 23–25. *Callidrepana vanbraeckeli* Gaede. Male: 23, genitalia; 24, eighth sternum and tergum. 25, Female genitalia.

Oreta singapura Swinhoe

Oreta singapura Swinhoe, 1892, Catalogue of Eastern Lepidoptera Heterocera in the Oxford University Museum, Part 1, p. 243. (Pl. 7, fig. 15, in colour; shape of wings inaccurate.)

TYPE. Holotype ♂ (not ♀ as stated in original description), Singapore; in Hope Department Museum, Oxford.

The colour-pattern readily distinguishes this species from the rest of the genus. The ovate spot, edged proximally with white, situated at the end of the cell on the fore wing, although present in some other species of this genus, is particularly conspicuous.

The extensive individual variation in the coloration of this species (see reference below to the colour plates) has resulted in the publication of numerous synonyms for the Papuan subspecies.

Oreta singapura singapura Swinhoe

Oreta singapura Swinhoe, 1892.
Oreta singapura Swinhoe, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 480.
Oreta singapura Swinhoe, Gaede, 1931, *Lepid. Cat.* **9** : 46.

The nominate subspecies can be separated from the remaining subspecies by the structure of the male genitalia (see Text-figs. 26–28). Neither the colour pattern nor the female genitalia seem to provide useful diagnostic characters.

DISTRIBUTION. Singapore, Malaya, Sumatra and Borneo.

Oreta singapura kalisi ssp. n.

TYPE. Holotype ♂, W. Celebes, Paloe, Loda, 4,000 ft., May, 1937 (J. P. A. Kalis).

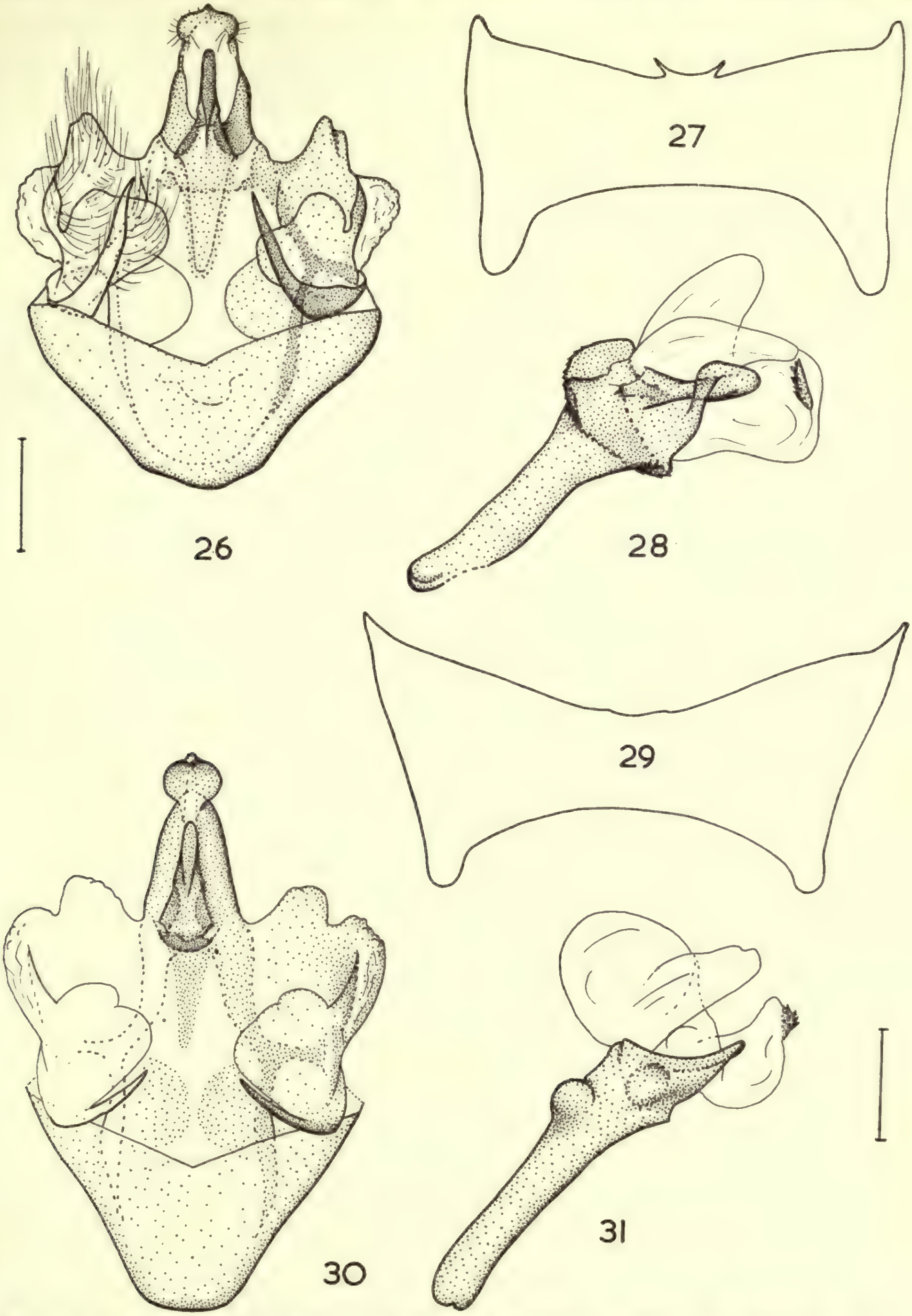
Apparently indistinguishable from the other subspecies externally, but easily recognized by the male genitalia (Text-figs. 29–31). The female is unknown.

DISTRIBUTION. Celebes.

MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). W. CELEBES : ♂ holotype, and 1 ♂ paratype with same data as holotype ; 5 ♂ paratypes, Paloe, Sidaonta 4,500 ft., June, 1937 (J. P. A. Kalis) ; 10 ♂ paratypes, Paloe, Koelawi, 3,100 ft., March, 1937 (J. P. A. Kalis) ; 7 ♂ paratypes, Paloe, Lindoe, 3,700 ft., Apr., May, 1937 (J. P. A. Kalis). *Landbouwhogeschool, Wageningen*. CELEBES : 1 ♂ paratype, Todjamboe, 13.vii.1937 (Toxopeus) ; 1 ♂ paratype, Paloe, Sidaonta, 1,500 m., viii.1937 (J. P. A. Kalis).

Oreta singapura continua Warren

Cobanilla continua Warren, 1899, *Novit. zool.* **6** : 313.
Oreta continua (Warren), Warren 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 313. (Good colour-plate, ♂.)
Oreta continua (Warren), Gaede, 1931, *Lepid. Cat.* **49** : 43.
Oreta dissimilis Warren, 1923, *in* Seitz. *Gross-Schmett. Erde*, **10** : 482. (Good colour-plate, ♂ and ♀.) Type locality : Dutch New Guinea, Snow Mts. ***Syn. nov.***
Oreta dissimilis Warren, Gaede, 1931, *Lepid. Cat.* **49** : 44.
Oreta aurata Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 483. (Good colour-plate, ♀.) Type locality : Dutch New Guinea, Snow Mts. ***Syn. nov.***
Oreta aurata Warren, Gaede, 1931, *Lepid. Cat.* **49** : 43.
Oreta ustimacula Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 483. (Good colour-plate ♀.) Type locality : Dutch New Guinea, Snow Mts. ***Syn. nov.***
Oreta ustimacula Warren, Gaede, 1931, *Lepid. Cat.* **49** : 43.
Holoreta leucospila Joicey & Talbot, 1917, *Ann. Mag. nat. Hist.* (8) **10** : 82. (Good colour-plate.) Type locality : Dutch Guinea, Wandammen Mts. ***Syn. nov.***

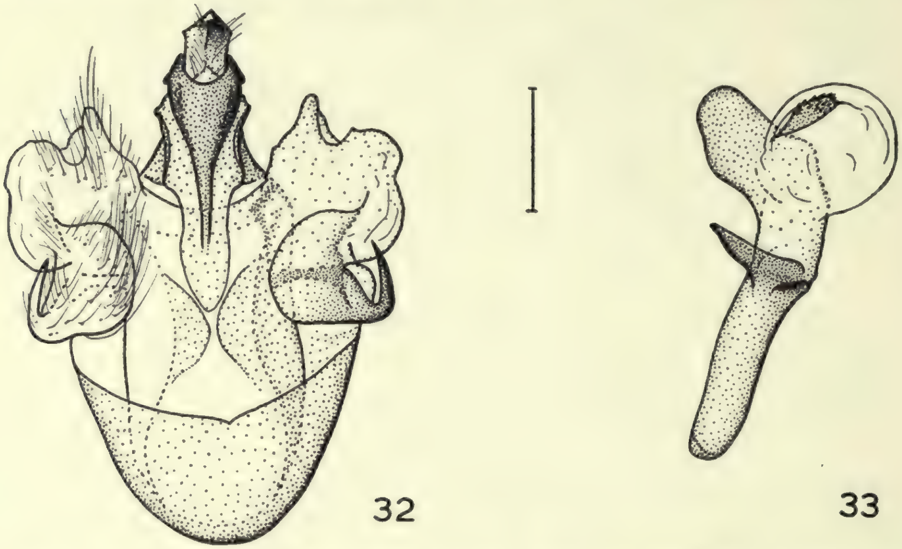


FIGS. 26–31. (26–28) *Oreta singapura singapura* Swinhoe. Male: 26, genitalia; 27, eighth sternum; 28, aedeagus. (29–31) *Oreta singapura kalisi* ssp. n. Male: 29, eighth sternum; 30, genitalia; 31, aedeagus.

Oreta singapura continua ab. *fulvata* Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 483 and *O. singapura continua* ab. *lilacina* Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 483 are figured in colour-plate 50 in Seitz. *Oreta singapura continua* ab. *flavobscura* (Joicey & Talbot), 1917, *Ann. Mag. nat. Hist.* (8) **10** : 83, is figured in colour plate 3 accompanying the original description.

TYPE. Holotype ♂, British New Guinea, Milne Bay, x.1889 (A. S. Meek). Best distinguished from the nominate subspecies by the male genitalia (Text-figs. 32–33).

DISTRIBUTION. British and Dutch New Guinea.



FIGS. 32–33. *Oreta singapura continua* Warren. Male : 32, genitalia ; 33, aedeagus.

Oreta griseotincta Hampson

Oreta griseotincta Hampson, 1893, *Fauna Brit. India, Moths*, **1** : 350.

TYPE. Holotype ♂, Sikkim, 1888 (Möller).

This species is not readily distinguishable externally from *Oreta carnea* (Butler), its closest apparent relative, but can be separated from it easily by the male and female genitalia (see Text-figs. 34–43).

There is considerable individual variation in the coloration. The brown colour of the upperside may be reddish or orange and either very dark or very pale.

The Malayan subspecies of this species and the closely related Indonesian species *Oreta carnea* (Butler) occur together in central and southern Malaya. Had it not been for this sympatry I should certainly have regarded them as subspecies of one species. This apparent break in the subspecies chain of *O. griseotincta* Hampson may not, however, be real; for although sympatry does exist in a broad geographical sense, information from the data labels suggests that there may be an ecological barrier between it and *O. carnea* (Butler) : *O. griseotincta* Hampson seems to be confined to the higher inland regions while *O. carnea* (Butler) is only found at much lower altitudes. This ecological isolation is presumably dependent upon some adaption to the environment, perhaps to different temperatures or to feeding on different food plants. A solitary male specimen of *O. griseotincta* Hampson (in the British Museum (Nat. Hist.)) from Singapore, which is comparatively low-lying, seems to present contradictory evidence, however, so that until further material, both from Malaya and Singapore is available, final conclusions cannot be drawn.

Oreta griseotincta griseotincta Hampson

Oreta griseotincta Hampson, 1893.
Oreta griseotincta Hampson, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484. (Good colour-plate, ♂.)
Oreta griseotincta Hampson, Gaede, 1931, *Lepid. Cat.* **49** : 44.
Oreta olivacea Dudgeon, 1899, *J. Bombay nat. Hist. Soc.* **12** : 657. ***Syn. nov.***
Oreta olivacea Dudgeon, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484.
Oreta olivacea Dudgeon, Gaede, 1931, *Lepid. Cat.* **49** : 45.
Oreta carnea nucicolor Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484. (Good colour-plate, ♀.) ***Syn. nov.***
Oreta carnea var. *nucicolor* Warren, Gaede, 1931, *Lepid. Cat.* **49** : 43.

Separable from the Malayan subspecies by the shape of the gnathus and valves in the male genitalia (Text-fig. 34). The peculiarly twisted ostial plate in the female genitalia of the only female available for examination (Text-fig. 37) may not be typical of this subspecies.

I have compared the holotype of *O. carnea nucicolor* Warren and *O. olivacea* Dudgeon with the holotype and topotypical material of *O. griseotincta* Hampson and found them to be conspecific.

DISTRIBUTION. NE. India and Sikkim.

Oreta griseotincta acutior ssp. n.

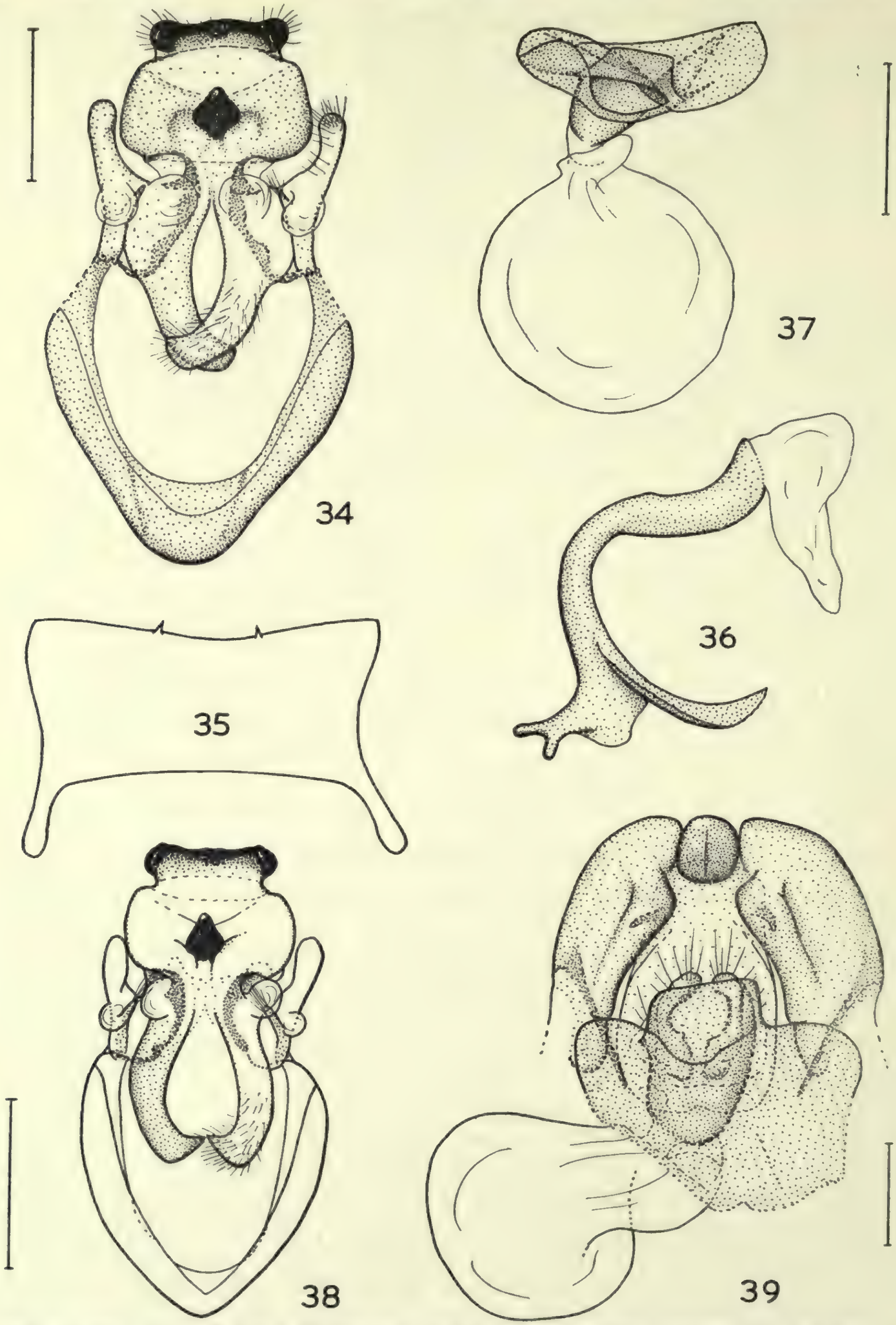
TYPE. Holotype ♂, Malay Penin., Selangor, Bukit Kutu, 3,500 ft., 18 April, 1926 (H. M. Pendlebury).

MALE. 33·6–41·6, 36·8 mm. (15). Similar to nominate subspecies but with more acutely pointed gnathus and more acutely pointed apex to anterior process of valve in genitalia (see Text-fig. 38).

FEMALE. 40·8 mm. (1). Similar to female of nominate race externally. (See Text-fig. 39 of female genitalia.)

DISTRIBUTION. Malaya and Singapore.

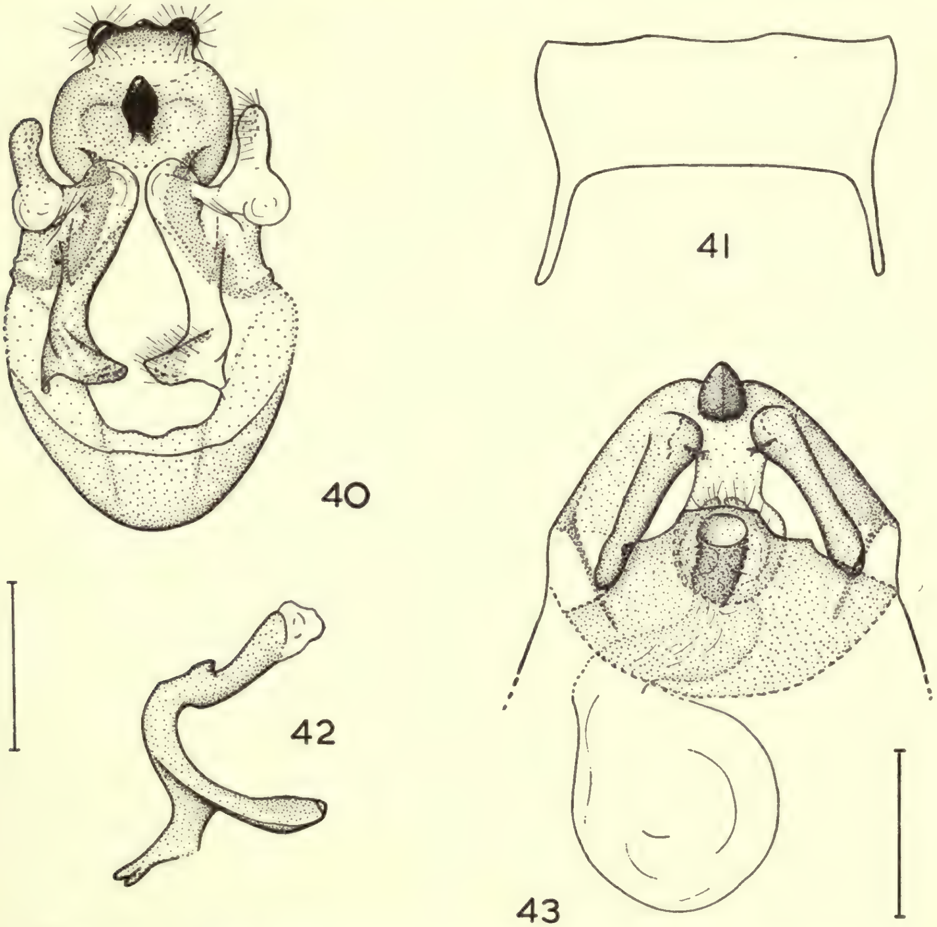
MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). MALAYA : 2 ♂ paratypes, Perak, Larut Hills, 3,700 ft., 13, 17.ii.1932 (H. M. Pendlebury) ; ♀ allotype, 3 ♂ paratypes, Pahang, Cameron Highlands, 4,700 ft., 4,800 ft., 23.vi.1935, 10–26.v. 1939 ; 5 ♂ paratypes, Pahang, Fraser's Hill, 4,200 ft., 4,250 ft., vi.1921, 6.i.1929, 11.ix.1931, 3, 16.vii.1936 (A. S. Corbet and others) ; ♂ holotype, 7 ♂ paratypes, Selangor, Bukit Kutu, 3,300–3,500 ft., iv.1915 ; 13, 18.iv.1926, 26.ix.1932 (H. M. Pendlebury, A. R. Sanderson). SINGAPORE : 1 ♂ paratype, Fraser's Hill, 17.vi. 1930 (V. N. Riley).



FIGS. 34–39. (34–36) *Oreta griseotincta griseotincta* Hampson. Male: 34, genitalia; 35, eighth sternum; 36, aedeagus. 37, Female genitalia. (38–39) *Oreta griseotincta acutior* ssp. n. 38, Male genitalia; 39, female genitalia.

Oreta carnea (Butler)

Agnidra carnea Butler, 1892, *Proc. zool. Soc. Lond.* **1892** : 125.
Oreta carnea (Butler), Warren, 1923, *in* Seitz, *Gross-Schmett. Erde,* **10** : 484.
Oreta carnea (Butler), Gaede, 1931, *Lepid. Cat.* **49** : 43.
Drepana berenica Swinhoe, 1893, *Ann. Mag. nat. Hist.* (6) **12** : 258. ***Syn. nov.***
Cobanilla berenica (Swinhoe), Swinhoe, 1902, *Trans. ent. Soc. London,* **1902** : 588, (= *hepaticata* Warren and *cardinalis* Warren.)



FIGS. 40–43. *Oreta carnea* (Butler). Male : 40, genitalia ; 41, eighth sternum ; 42, aedeagus. 43, Female genitalia.

Oreta berenice (*sic*) (Swinhoe), Warren, 1923, *in* Seitz, *Gross-Schmett. Erde,* **10** : 485.
Oreta berenica (Swinhoe), Gaede 1931, *Lepid. Cat.* **49** : 43.
Cobanilla hepaticata Warren, 1891, *Novit. zool.* **4** : 13. ***Syn. nov.***
Oreta hepatica (*sic*) (Warren), Warren, 1923, *in* Seitz, *Gross-Schmett. Erde,* **10** : 485. (Good colour-plate, ♂.)
Oreta hepaticata (Warren), Gaede, 1931, *Lepid. Cat.* **49** : 44.

Cobanilla cardinalis Warren, 1897, *Novit. zool.* **4** : 13. ***Syn. nov.***
Oreta cardinalis (Warren), Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 485. (Good colour-plate ♀.)
Oreta cardinalis (Warren), Gaede, 1931, *Lepid. Cat.* **49** : 43.

TYPE. Holotype ♀, (Borneo), Sandakan.

Similar externally to *O. griseotincta* Hampson, but readily distinguished from it by the male and female genitalia (Text-figs. 40–43).

I have examined the holotype of *Drepana berenica* Swinhoe, *Cobanilla hepaticata* Warren, *Cobanilla cardinalis* Warren and *Oreta carnea* (Butler) and found them to be conspecific.

DISTRIBUTION. Malaya, Singapore, Sumatra, Java and Borneo. (See remarks on the distribution under *O. griseotincta* Hampson.)

Oreta identata sp. n.

TYPE. Holotype ♂, W. Celebes, Paloe, G. Tompoe, 2,700 ft., Jan., 1937 (J. P. A. Kalis).

Best distinguished from *Oreta griseotincta* Hampson and from *Oreta carnea* Butler, its closest apparent relatives, by the male and female genitalia (see Text-figs.).

MALE (Pl. 66, fig. 3). 39·2, 37·0–41·6 mm. (30). Head and palps usually dark brown or dark reddish brown, paler towards labrum ; antennae as for dorsal surface of thorax, largest antennal pectination equal to one-half greatest diameter of eye.

Upperside of thorax usually same colour as ground colour of wings ; similar in colour to medial shade of fore wing in some specimens. Wing shape and form of colour-pattern as in plate. Venation of fore wing as in Text-fig. 44. Hind wing with Sc approximated to Rs distal to end of cell. Upperside of fore wing lustrous, very variable in colour : pale greyish, yellowish or reddish brown, with or without well-marked fasciae and medial shade ; reddish or purplish brown, with or without medial markings ; dark reddish or purplish brown with or without medial markings. Apical area of wing and basal area invariably paler than rest of wing and often irrorated with white scales. Upperside of hind wing usually similar in colour to ground colour of fore wing, but sometimes of same colour as medial shade of fore wing ; medial shade usually weakly marked. Underside of both wings lustrous ; usually very pale reddish brown speckled with black ; postmedial fascia on both wings present, usually moderately well marked. Costa of fore wing yellowish most strongly coloured apicad.

Underside of thorax usually pale yellowish brown. Legs with long dense fringes of hair-like scales. Following parts of legs bright reddish brown or orange : outer surface of femur, tibia and whole of tarsus of prothoracic leg ; outer surface of tibia and tarsus, and both surfaces of tarsal fringe of mesothoracic leg ; and outer surface of tibial fringe and both surfaces of tarsal fringe of metathoracic leg. Remaining surfaces of legs pale yellowish brown.

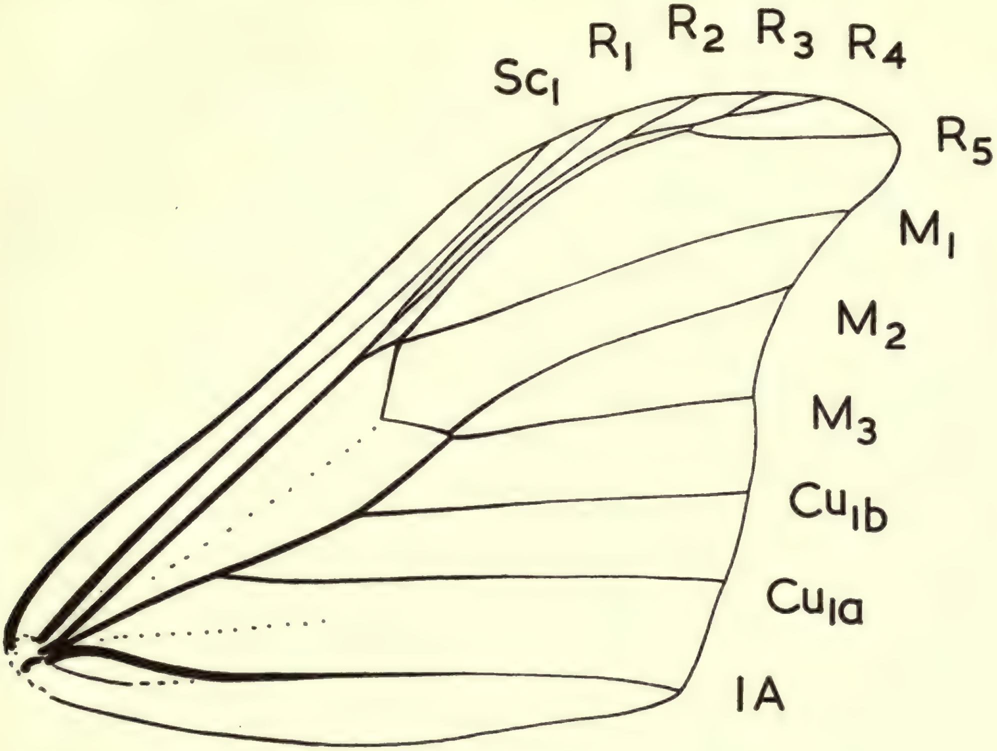
Abdomen similar in colour to corresponding parts of thorax, but paler posteriad dorsally.

Male genitalia as in Text-figs. 45–47.

Female. 43·2, 37·4–45·6 mm. (16). Similar to male but with shape and form of colour-pattern of fore wing as in female *O. griseotincta* Hampson (see plate in Seitz, *loc. cit.*). Colour of wings as in male, but often much paler.

Female genitalia as in Text-fig. 48.

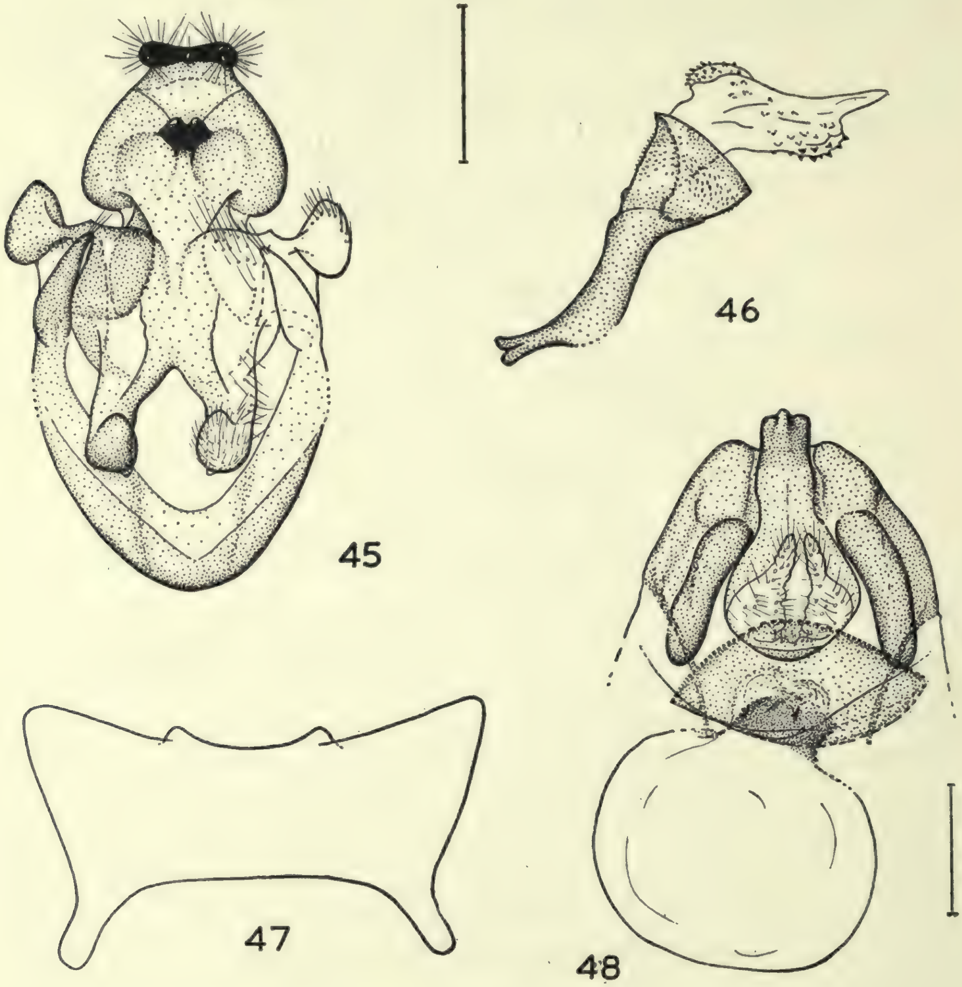
Distribution. NE., W. and SW. Celebes.



44

Fig. 44. *Oreta identata* sp. n., fore wing venation.

Material examined. *British Museum* (*Nat. Hist.*) N. Celebes : 1 ♀ paratype, N. Celebes (Curtis) ; 1 ♀ paratype, Minahassa, Tomohon, vii.1954 (C. A. M. G. Alston). W. Celebes : 2 ♂ paratypes, Paloe, G. Rangoenau, 1,800 ft., Nov. and Dec., 1936 (J. P. A. Kalis) ; holotype ♂ and 10 ♂ paratypes, Paloe, G. Tompoe, 2,700 ft., Feb. and Jan., 1937 (J. P. A. Kalis) ; 1 ♂ and 2 ♀ paratypes, Paloe, Koelawi, 3,100 ft., March, 1937 (J. P. A. Kalis) ; 8 ♂ paratypes, Paloe, Lindoe, 3,700 ft., April, 1937 (J. P. A. Kalis) ; 5 ♂ paratypes, Paloe, Loda, 4,000 ft., May, 1937 (J. P. A. Kalis) ; 1 ♀ and 5 ♂ paratypes, allotype ♀, Paloe, Sidaonta, June, 1937 (J. P. A. Kalis). SW. Celebes : 2 ♀ paratypes, Parangbobo Goa, G. Lampobattang, 5,000 ft., May, 1938 (J. P. A. Kalis) ; 2 ♀ paratypes, Tjamba, near Maros, 1,500 ft., Feb., 1938 (J. P. A. Kalis) ; 6 ♂ paratypes, Pangean, near Maros, 2,000 ft., March, 1938 (J. P. A. Kalis). *Zoological Museum, Amsterdam.* NE. CELEBES :



FIGS. 45–48. *Oreta identata* sp. n. Male : 45, genitalia ; 46, aedeagus ; 47, eighth sternum. 48, Female genitalia.

4 ♀ paratypes, Minahassa, 1920 (Coll. P. J. v. d. Bergh, Lzn.) ; 1 ♀ paratype, Bolang Mongondo (Coll. P. J. v. d. Bergh, Lzn.) ; 2 ♀ paratypes, Rurukan, 1920. *Rijksmuseum van Natuurlijke Historie, Leiden.* NE. CELEBES : 2 ♀ paratypes, Minahassa, 1922 (P. J. v. d. Bergh). *Landbouwhogeschool, Wageningen.* W. CELEBES : Paloe Bay, Belitang, 15–20 July, 1928.

Oreta extensa Walker

Oreta extensa Walker, 1855, *List Lep. Het. Br. Mus.* **5** : 1166.
Oreta extensa Walker, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484.
Oreta extensa Walker, Gaede, 1931, *Lepid. Cat.* **49** : 44.
Oreta figlina Swinhoe, 1905, *Ann. Mag. nat. Hist.* (7) **16** : 142. ***Syn. nov.***
Oreta figlina Swinhoe, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484. (Poor, misleading colour-plate.)
Oreta figlina Swinhoe, Gaede, 1931, *Lepid. Cat.* **49** : 44.

TYPE. Holotype ♂, East Indies.

From an examination of the holotype and material of this species from India and Indonesia it is clear that the type locality must be restricted. I select " Java " as the restricted locality for this species.

Externally this species closely resembles *O. roepkei* sp. n. but the apex of the fore wing is usually not so strongly produced, and the oblique, postmedial fascia on the fore wing is usually straight posteriorly, not slightly sinuous. The male and female genitalia readily separate the species (Text-figs. 49–52).

There are two colour-forms as in *O. roepkei* sp. n.

DISTRIBUTION. NE. India, Sumatra and Java (including E. Java). Specimens from S. India, Ceylon, Formosa, Celebes and Buru (in the British Museum (Nat. Hist.)) probably also belong to this species.

Oreta roepkei sp. n.

TYPE. Holotype ♂ (E. Java) Tengger, Singolangoe, 5,000 ft., May, 1934 (J. P. A. Kalis).

This species can usually be distinguished from the Javanese specimens of *O. extensa* Walker, probably the most closely related species, by the sinuous, not straight, posterior part of the postmedial fascia. The male and female genitalia readily separate the two species.

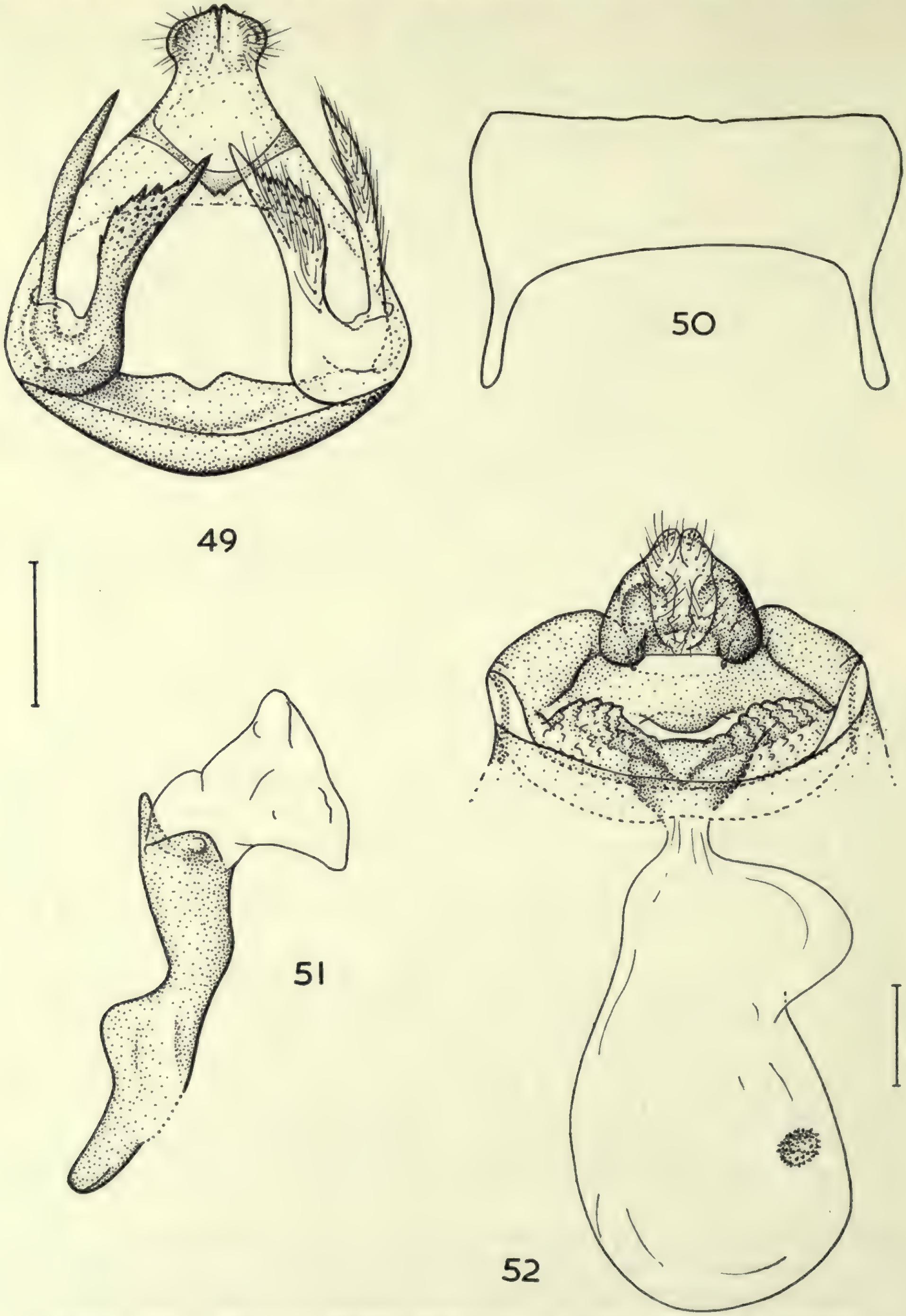
A marked dimorphism in the colour-pattern of the males is worthy of note and is described below.

MALE (Pl. 66, fig. 1). 46·4, 42·4–49·4 mm. (25). Yellow-and-brown form. Head and palp red. Antenna unipectinate ; pale yellow-brown ; longest antennal pectination equal to about one-half greatest diameter of eye.

Collar yellow. Upperside of thorax pale reddish brown speckled with white. Underside of thorax pale yellow or pale reddish yellow, but red anteriorly. Outer surface of legs reddish orange, less strongly pigmented on inner surface.

Wing shape and form of colour-pattern of upperside as in plate. Fore wing venation as in Text-fig. 53. Hind wing with Sc approximating to Rs distal to end of cell.

Upperside of fore wing reddish-brown lightly striated transversely with dark brown, but with yellow basal area striated with reddish brown, and with yellowish area lightly irrorated with black distal to posterior end of yellow postmedial fascia. Costa yellow basad. Apex and basal part of costal area irrorated with white. Small white discocellular spot and sometimes trace of spot at posterior angle of cell. Fore



FIGS. 49–52 *Oreta extensa* Walker. Male; 49, genitalia; 50, eighth sternum; 51, aedeagus. 52, Female genitalia.

wing lustrous except for cell, narrow area proximal to anterior part of postmedial fascia and small area anteriad of tornus. Hind wing with dark areas reddish brown and pale areas yellow ; lustrous except for band along outer margin near anal angle ; cell-spots as in fore wing.

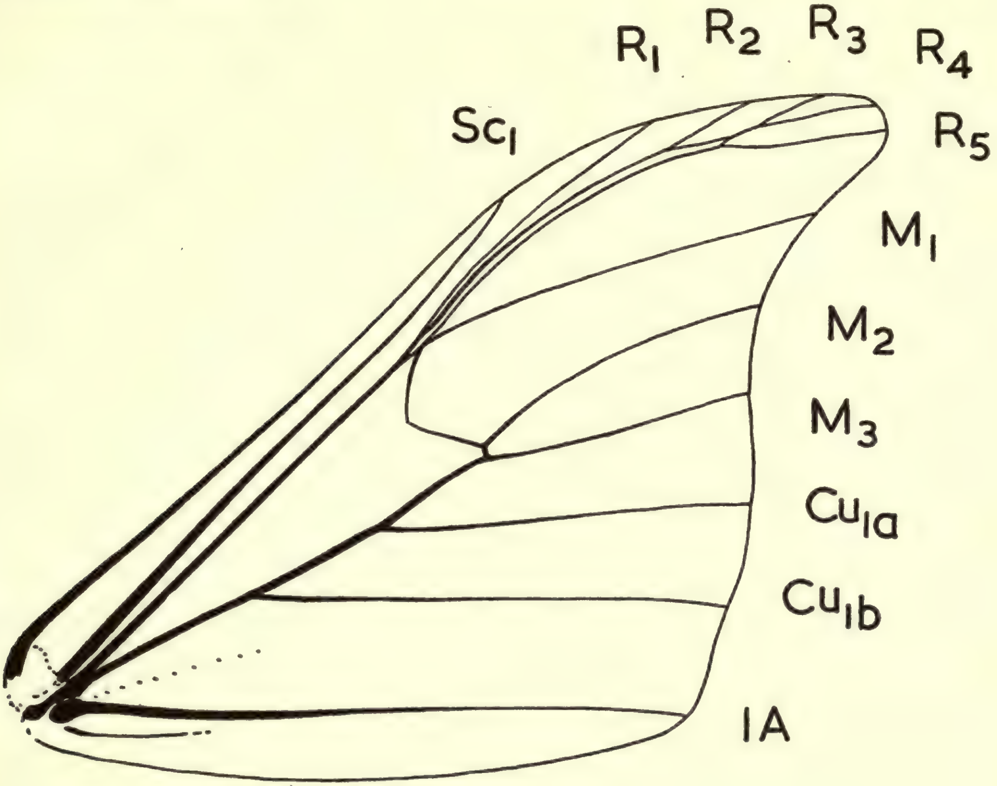


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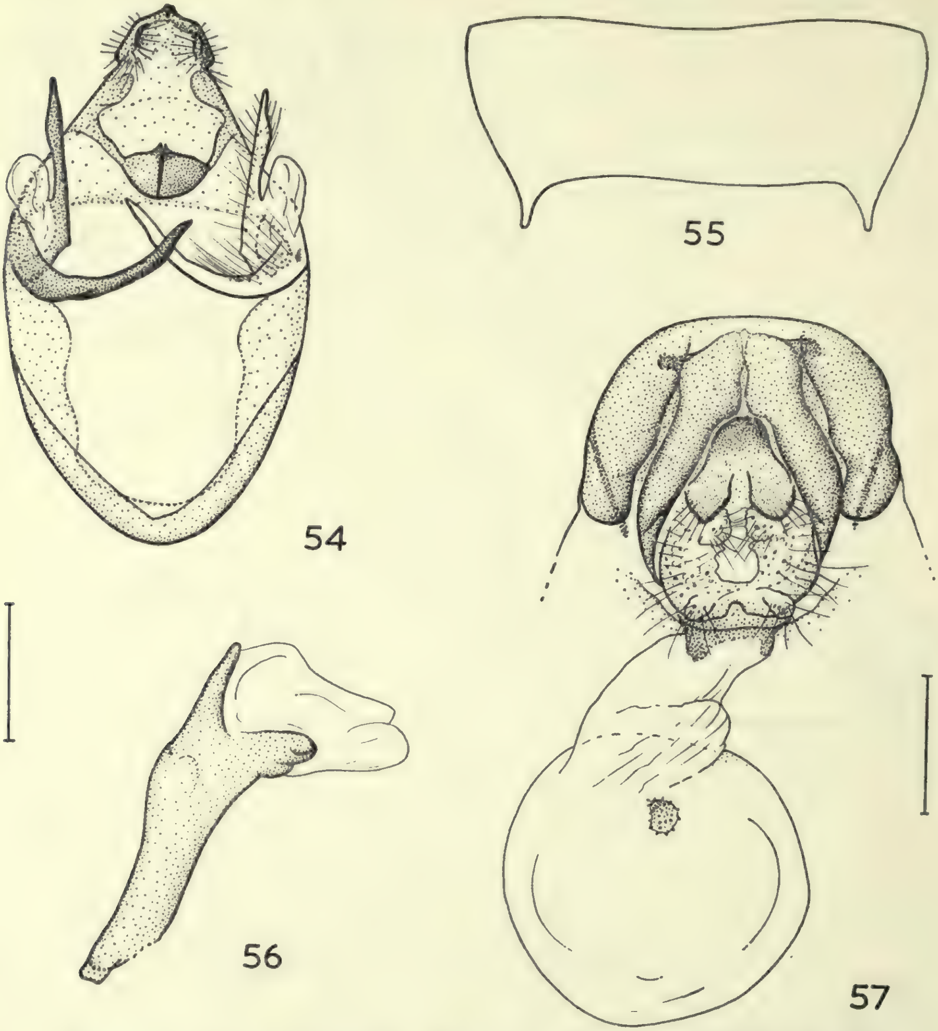
FIG. 53. *Oreta roepkei* sp. n., fore wing venation.

Underside of fore wing reddish orange striated with black ; trace of broad, yellow postmedial fascia, most well-marked costad. Underside of hind wing yellow, but reddish orange basad striated with black in costal area, and reddish orange along anal margin and in broad area extending from apex nearly half-way along outer margin of wing. Underside of both wings lustrous.

Abdomen reddish brown dorsally lightly irrorated with white ; darker band anteriorly followed by yellowish transverse band ; yellow posteriorly. Sides of abdomen pale reddish yellow. Ventral surface reddish orange.

Brown form. Upperside of both wings reddish brown with trace of pale basal area and weakly marked postmedial fascia. Fore wing irrorated with black between posterior end of postmedial fascia and outer margin. Hind wing often strongly speckled with black especially at apex. Underside of both wings reddish orange, often speckled and transversely striated with black especially at tornus of fore wing and apex of hind wing.



Figs. 54–57. *Oreta roepkei* sp. n. Male : 54, genitalia ; 55, eighth sternum ; 56, aedeagus. 57, Female genitalia.

Male genitalia as in Text-figs. 54–56.

Female (Pl. 66, fig. 2). 51·5, 50·0–53·0 mm. (2). Similar to male but with following differences. Longest antennal pectination equal to about two-fifths greatest diameter of eye. Shape of fore wing as in plate. Colour of both wings intermediate between two forms of male, and with black speckles extending as band along distal margin of postmedial in fore wing. Underside of fore wing with broad, well-marked, yellow postmedial fascia. Underside of hind wing as for yellow-and-brown form of male.

Female genitalia as in Text-fig. 57.

DISTRIBUTION. Known only from East Java.

MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). E. JAVA : holotype ♂ and 20 ♂ paratypes, Tengger, Singolangoe, 5,000 ft., April, May, June, 1934 (J. P. A. Kalis) ; allotype ♀ and 11 ♂ paratypes, Kletak Tengger, 6,000 ft., May, June, 1934 (J. P. A. Kalis) ; 1 ♂ paratype, Waterfall Baoeng, 1,200 ft., July, 1934 (J. P. A. Kalis) ; 1 ♀ paratype and 12 ♂ paratypes, Djoenggo Ardjoeno, 4,500 ft., May, June, 1934 (J. P. A. Kalis) ; 4 ♂ paratypes, Nongkodjadjar, 4,000 ft., Jan., May, June, 1934 (J. P. A. Kalis). *Rijksmuseum van Natuurlijke Historie, Leiden.* E. JAVA : 1 ♂ paratype, Nongkodjadjar, 1911.

Oreta vatama Moore

Oreta vatama Moore, 1865, *Proc. zool. Soc. Lond.* **1865** : 816.

Oreta obtusa Walker, Strand, 1911, *in* Seitz, *Gross-Schmett. Erde*, **2** : 204 (*partim*). (Good colour-plate of *Oreta vatama Moore.*)

Oreta obtusa var. *vatama* Moore, Gaede, 1931, *Lepid. Cat.* **49** : 45.

Oreta obtusa Walker, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484 (*partim*).

TYPE. Holotype ♀, Darjeeling. Not examined. Said by Moore (*loc. cit*) to have been in the collection of A. E. Russel which according to Horn & Kahle (1935–37) has been lost.

The British Museum (Nat. Hist.) possesses, however, a specimen from the type locality which exactly fits the original description and which bears a determination label "*Oreta vatama* Moore" in Moore's handwriting. There seems little doubt therefore about the identity of this species. Examination of *O. vatama* Moore has shown that it is quite distinct from *Psiloreta obtusa* (Walker) to which various authors have referred it.

Psiloreta obtusa (Walker) comb. nov.

Oreta obtusa Walker, 1855, *List. Lep. Het. Br. Mus.* **5** : 1167.

Oreta obtusa Walker, Strand, 1911, *in* Seitz, *Gross-Schmett. Erde*, **2** : 204, *partim*, (= *vatama* Moore). (Colour-plate is of *O. vatama* Moore, not *O. obtusa* Walker.)

Oreta obtusa Walker, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 484, *partim*.

Oreta obtusa Walker, Gaede, 1931, *Lepid. Cat.* **49** : 45, *partim*.

Oreta obliquilinea Hampson, 1893, *Fauna Brit. India, Moths*, **1** : 349. ***Syn. nov.***

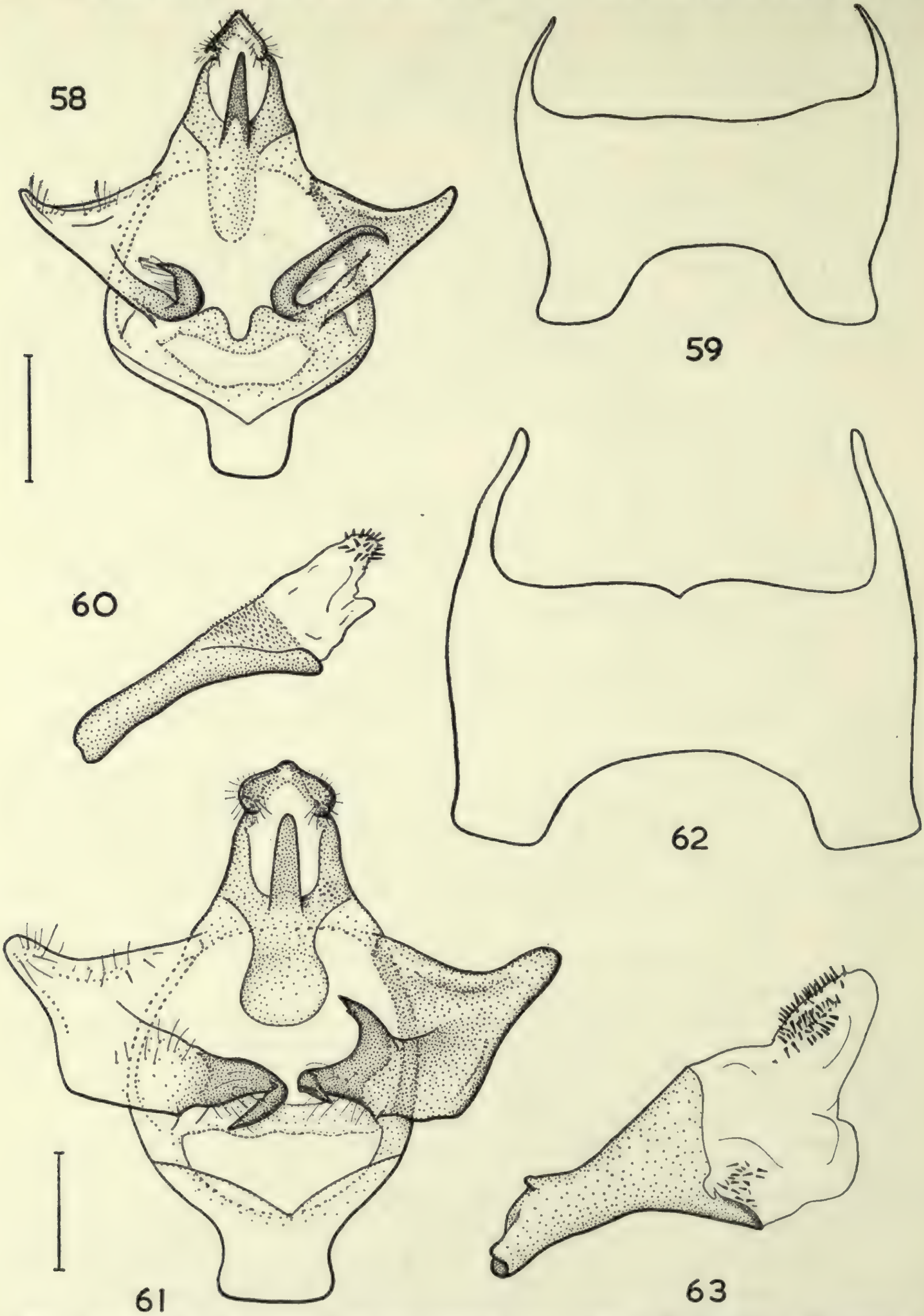
Psiloreta inconspicua, Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 486. (One of the two ♂ syntypes well illustrated.) ***Syn. nov.***

Psiloreta inconspicua Warren, Gaede, 1931, *Lep. Cat.* **49** : 48.

TYPE. Holotype ♀, India, Silhet.

I have compared the types (including the genitalia) of *O. obliquilinea* Hampson and *P. inconspicua* Warren with the type of *O. obtusa* Walker (and matched specimens) and found them conspecific.

DISTRIBUTION. India, Burma, China, Formosa, Indonesia.



Figs. 58–63. (58–60) *Psiloreta obtusa obtusa* (Walker). Male : 58, genitalia ; 59, eighth sternum ; 60, aedeagus. (61–63) *Psiloreta obtusa speciosa* Bryk. Male : 61, genitalia ; 62, eighth sternum ; 63, aedeagus.

Psiloreta obtusa obtusa (Walker)

This subspecies is well illustrated in Seitz, (*loc. cit.*) (as *P. inconspicua* Walker). The male genitalia are figured in Text-figs. 58–60.

Known only from North India.

Psiloreta obtusa speciosa Bryk stat. nov.

Psiloreta speciosa Bryk, 1943, *Ark. Zool.* **34**A, No. 13 : 26. (Excellent photograph.)

Type. Holotype ♂ (NE. Burma), Kambaiti, 2,000 m., 12–17.vi.1934 (in the Naturhistoriska Riksmuseum, Stockholm).

Distinguishable from the nominate subspecies by the more strongly produced apex of the fore wing, and from all the other subspecies by the male genitalia (Text-figs. 61–63).

Distribution. NE. Burma.

Psiloreta obtusa aequitermen Warren stat. nov.

Psiloreta aequitermen Warren, 1923, *in* Seitz, *Gross-Schmett. Erde*, **10** : 485. (Good colour-plate, except for outer margin of hind wing which should be evenly rounded.)
Psiloreta aequitermen Warren, Gaede, 1931, *Lepid. Cat.* **49** : 47.

Type. I select the following syntype as the lectotype : a male, Malay Peninsula, Gunong, Ijau ; Drepanidae genitalia slide No. 832. Labelled in Warren's handwriting " *Psiloreta aequitermen* Type ♀ Warr.".

The males can usually be distinguished from those of the nominate subspecies, but not from the other subspecies, by the more strongly produced apex of the fore wing (see plates in Seitz, **10**). The male genitalia readily separate this subspecies from the remaining subspecies (Text-figs. 64–65).

Distribution. Malaya, Sumatra and Celebes.

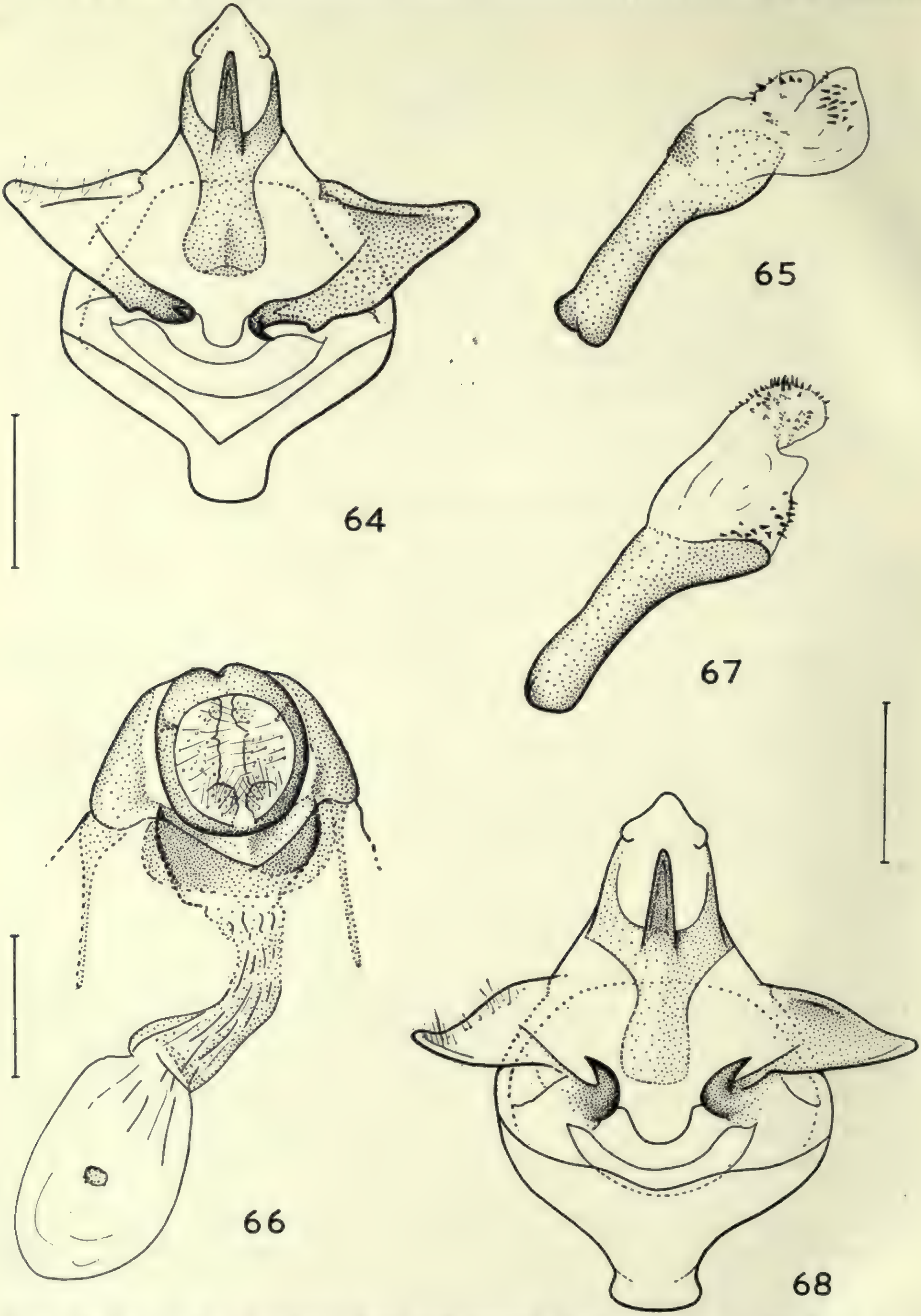
Psiloreta obtusa javae ssp. n.

Type. Holotype male, Java, Mt. Gedeh, Aug., 1926.

Very similar externally to the nominate subspecies, but with the outer margin of the fore wing nearly straight in the male and only slightly convex in the female. Readily distinguished from the remaining subspecies by the male genitalia (Text-figs. 67–68). Not distinguishable from the nominate subspecies by the female genitalia (Text-fig. 66).

Measurements. Male : 38·8, 34·4–43·6 mm. (40). Female : 45·1, 41·6–50·0 mm. (9).

Polymorphism. As in *P. obtusa aequitermen* Warren and the nominate subspecies, this subspecies occurs in two distinct colour-forms which, from the data on the labels, appear to be unrelated to the date of capture. There is a yellow-and-brown from similar in pattern to the illustration of *P. obtusa aequitermen* Warren in Seitz, **10**, and a nearly uniformly coloured brown form as in the illustration of *Psiloreta inconspicua* Warren in Seitz, **10**. A further more rare yellow form has all the markings,



Figs. 64–68. (64–65) *Psiloreta obtusa aequitermen* Warren. Male: 64, genitalia; 65, aedeagus. (66–68) *Psiloreta obtusa javae* ssp. n. 66, female genitalia. Male: 67, aedeagus; 68, genitalia.

except for the postmedial fascia and apical markings of the fore wing and the dark spot at the outer margin of the hind wing, absent or very faintly marked. There are several specimens exhibiting a colour-pattern intermediate between this yellow form and the yellow-and-brown form. Of 68 males examined 28 belonged to the brown form and 28 to the yellow-and-brown form : the remaining 12 belonged to the yellow form or were intermediate between this form and the yellow-and-brown form. Of 8 females examined, 4 were yellow-and-brown, 1 brown, and 3 yellow or intermediate between the yellow form and yellow-and-brown form.

DISTRIBUTION. Java and Bali.

MATERIAL EXAMINED. *British Museum* (*Nat. Hist.*). E. JAVA : 1 ♀ and 18 ♂ paratypes, Nonkodjadjar, 4,000 ft., Jan., Apr., May, June, Dec., 1933, 1934 (J. P. A. Kalis) ; 1 ♀ and 7 ♂ paratypes, Kletak Tengger, 6,000 ft., May, June, 1934 (J. P. A. Kalis) ; 1 ♀ and 14 ♂ paratypes, Djoenggo Ardjoeno, 4,500 ft., May, June, 1934 (J. P. A. Kalis) ; 1 ♀ and 16 ♂ paratypes, Singolangoe Tengger, 5,000 ft., Apr.–July, 1934 (J. P. A. Kalis) ; 2 ♂ paratypes, Waterfall Baoeng, 1,200 ft., July, 1934 (J. P. A. Kalis). W. JAVA : holotype ♂, allotype ♀ and 2 ♂ paratypes, Mt. Gedeh, Aug., Sept., 1926 ; 1 ♂ paratype, Mt. Gedeh, 5,000 ft., Aug., Sept., 1924 (G. Overdijkink) ; 2 ♂ and 2 ♀ paratypes, Mt. Gedeh, 4,000 ft., 25.x–2.xi.1924 (G. Overdijkink) ; 2 ♂ paratypes, Mt. Gedeh, Perbawatie, 4,000–4,500 ft., 1.iv.1938 ; 1 ♀ paratype, Mt. Gedeh, Soekaboemi, iii.1938 (M. E. Walsh). E. BALI : 2 ♀ paratypes, Batoeriti, 3,500 ft., June, 1935 (J. P. A. Kalis). *Rijksmuseum van Natuurlijke Historie, Leiden.* JAVA : 1 ♂ and 1 ♀ paratype, Malabar Geb., Tjinjiroean, Gouv. Kina-Ondern., 1,700 m., Oct., Nov., 1909 (Dr. H. W. v. d. Weele) ; 1 ♀ paratype, (?) geb. 1888.

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BRITISH MUSEUM 12 APR 1961 NATURAL HISTORY

PLATE 65

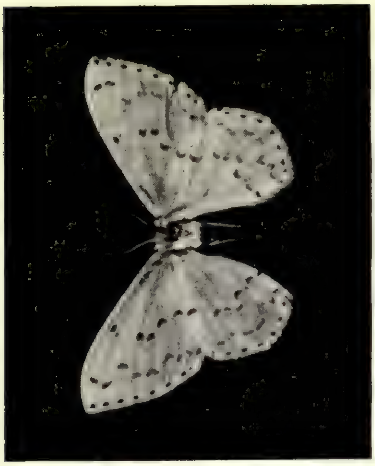
FIG. 1. *Teldenia latilinea* sp. n., holotype ♂.

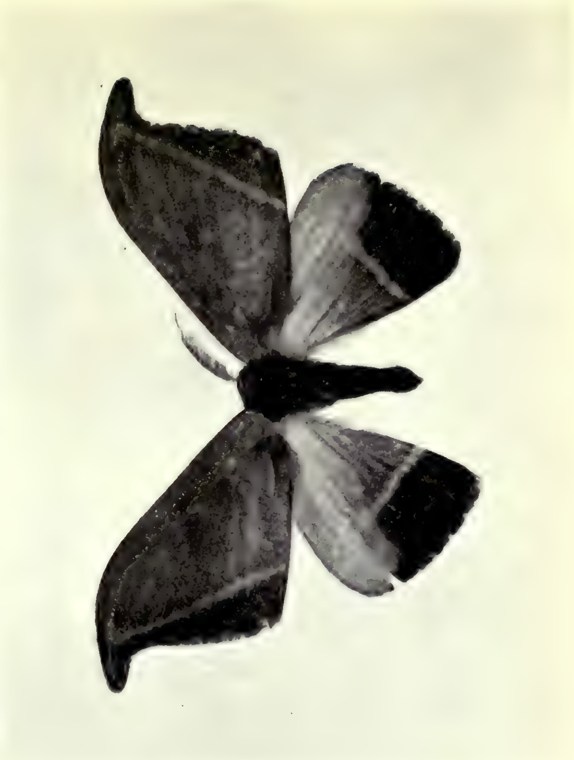
FIG. 2. *Teldenia niveata* (Pagenstecher), ♂.

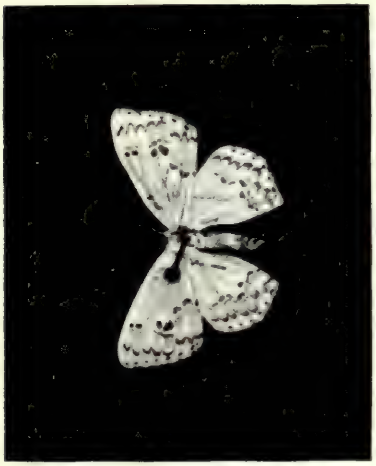
FIG. 3. *Teldenia angustifascia* sp. n., holotype ♂.

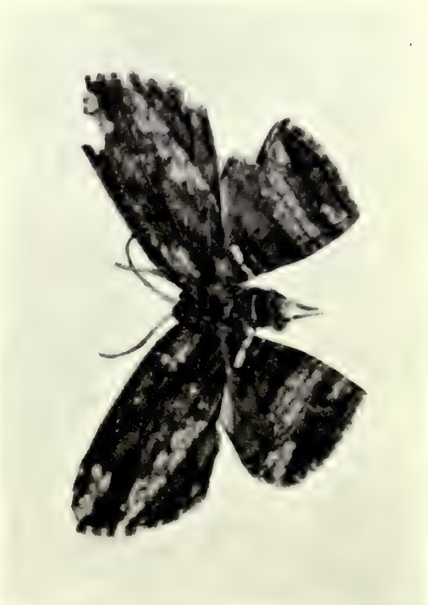
FIG. 4. *Drapetodes magnifica denotata* ssp. n., holotype ♂.

FIG. 5. *Callidrepana vanbraeckeli* Gaede, holotype ♂.









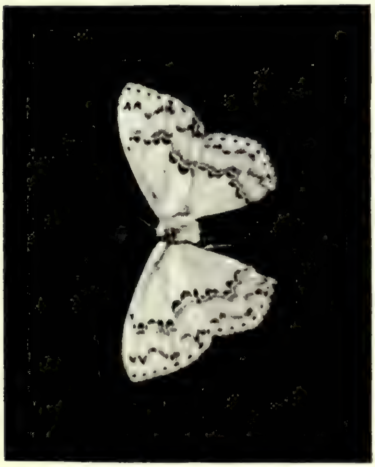
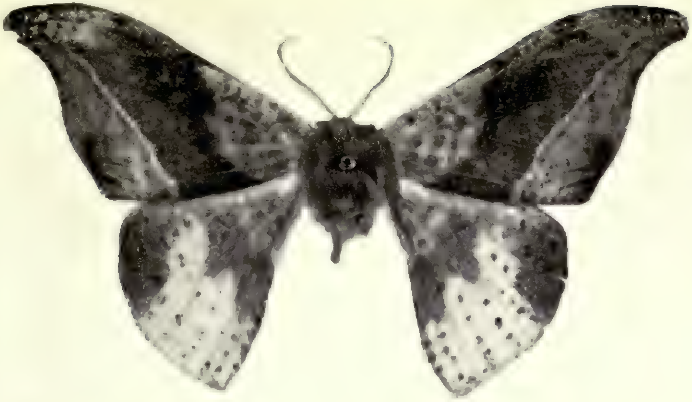


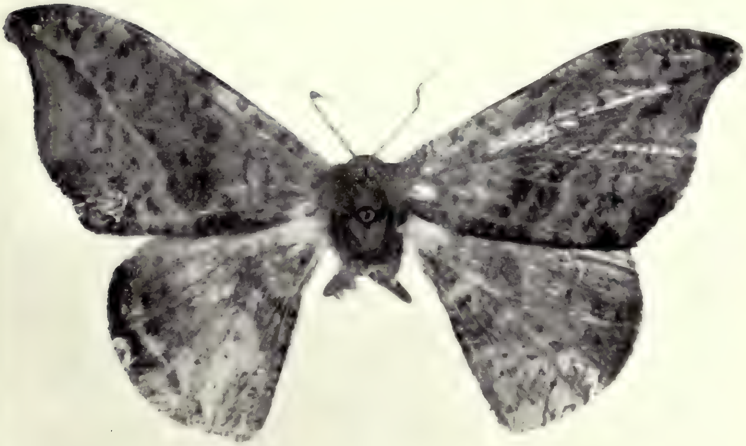
PLATE 66

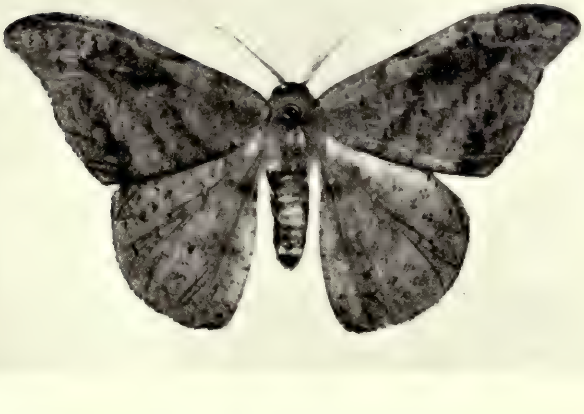
FIG. 1. *Oreta roepkei* sp. n., holotype ♂.

FIG. 2. *Oreta roepkei* sp. n., allotype ♀.

FIG. 3. *Oreta kalisi* sp. n., ♂.







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A PRELIMINARY REVISION OF THE FAMILIES AND SUBFAMILIES OF *ACRIDOIDEA (ORTHOPTERA, INSECTA)*

BRITISH MUSEUM
20 JUL 1961
NATURAL HISTORY

V. M. DIRSH
Anti-Locust Research Centre, London

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ENTOMOLOGY Vol. 10 No. 9
LONDON: 1961

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Pp. 349–419; 34 *Text-figures*

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By V. M. Dirsh

Anti-Locust Research Centre, London

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INTRODUCTION

THE status and scope of families and subfamilies of *Acridoidea* have undergone many changes, but the general system within the group is still far from adequate. A few families are well defined, but there are others (e.g. *Eumastacidae*), and also some subfamilies (e.g. *Catantopinae*), which are highly heterogeneous assemblages and need thorough revision.

In this paper an attempt is made to establish a tentative classification of *Acridoidea* based mainly, though not exclusively, on Palaearctic and African material. Insufficiency of material, particularly from South America and from Australasia, makes a comprehensive review of the whole group impossible at present. Moreover, although as many as 1,527 valid genera have been described up to the end of 1958, this number is probably still far from the total, and one may expect possibly twice as many more to be described. Consequently, the system outlined below must be regarded as preliminary only.

In the diagnoses of the families and subfamilies below, only the most important characters are mentioned. The characters which are common to all families, and those which have not been checked for the majority of the genera of a certain family or subfamily, are omitted from the diagnoses but are mentioned in discussions or in the tables.

The keys to families and subfamilies are based on external characters only, which usually suffice for recognition of them. The distribution of both external and internal characters throughout families and subfamilies is presented in Tables II and III respectively. It will be seen that the internal and external characters often do not run parallel.

The list of genera of each family or subfamily includes only those examined by the author, arranged in alphabetical order. In many cases all the known genera were studied, and this is indicated. No lists are provided in the case of the very large and sufficiently distinct units such as *Pyrgomorphidae*, *Acridinae* and the somewhat artificial subfamily *Catantopinae*.

I am greatly indebted to Dr. B. P. Uvarov for his valuable advice and criticism in the course of preparing this paper, to Dr. T. H. C. Taylor, Director of the Anti-Locust Research Centre, for sponsoring this work, and to Dr. K. H. L. Key for his valuable critical comments.

STATUS AND SCOPE OF *ACRIDOIDEA*

The systematic position of *Acridoidea,* as suggested in recent leading orthopterological and general entomological works, is presented in Table I. The main changes in this century have been as follows :

Handlirsch (1908) divided the order *Orthoptera* Latreille, 1793 (= *Saltatoria* Latreille, 1817), into the suborder *Locustoidea,* with the families *Locustidae* (= *Tettigoniidae*), *Gryllidae, Tridactylidae,* and *Gryllotalpidae,* and the suborder *Acridioidea* with a single family *Acridiidae.*

Ander (1939) divided the order *Saltatoria* into the suborders *Ensifera* and *Caelifera,* the first of which corresponds to Handlirsch's *Locustoidea* and the second to Handlirsch's *Acridioidea,* except that he transferred the family *Tridactylidae* to the suborder *Caelifera* as a superfamily. *Acridoidea* were regarded by him as the second superfamily of the suborder.

Some authors, however, even earlier (Jakobson & Bianki, 1904), regarded all the superfamilies of Ander as suborders. Others (Schvanwitsh, 1949) omitted the term suborder and used the term superfamily instead.

In this paper, following Handlirsch's scheme, the *Acridoidea* are regarded as a suborder of the order *Orthoptera.*

TABLE I.—*Changes in the Status of* Acridoidea

	Taxonomic categories		
Authors	Order	Suborder	Superfamily
Jakobson & Bianki, 1904	Orthoptera	Acridiodea	—
Handlirsch, 1908	Orthoptera	Acridioidea	—
Chopard, 1920	Orthoptera	Locustodea	—
Schröder, 1925	Saltatoria	Acridiodea	—
Uvarov, 1928	Orthoptera	Acridodea	—
Weber, 1938	Saltatoria	Acridoidea	—
Ander, 1939	Saltatoria	Caelifera	Acridoidea
Chopard, 1949	Orthoptera	Caelifera	Acridoidea
Shvanwitsh, 1949	Orthoptera	—	Acridoidea
Bey-Bienko & Mistshenko, 1951	Orthoptera	Caelifera	Acridoidea
Beier, 1955	Saltatoptera	Caelifera	Acridides
This work	Orthoptera	Acridoidea	—

A question concerning the scope of the suborder *Acridoidea* is the position of *Tetrigidae,* which some authors continue to regard as one of the families of *Acridoidea,* although Chopard (1920), Walker (1919–22), Snodgrass (1937), Carpentier (1932, 1936), and Ander (1939) have proved that this view is incorrect. Beier (1955) has formally established the superfamily *Tetrigides* as equal in rank to his *Acridides* (= *Acridoidea*) and consisting of the families *Tetrigidae, Tridactylidae* and *Cylindrachetidae.*

Beier's superfamily *Tetrigides* is here regarded as the suborder *Tetrigoidea,* equal in rank with *Acridoidea.*

A discussion of affinities of *Tetrigoidea* with other Orthopteroid groups is outside the scope of this paper, but the main characters separating them from *Acridoidea* are as follows[1] :

1. The thoracic skeletons of *Tetrigidae* and *Acridoidea* in many essential features are very different (Carpentier, 1936). The pronotum in *Tetrigidae* is strongly elongated, covering the whole or the greater part of the body, which is never the case in *Acridoidea.*

2. The structure of the phallic complex is entirely different. In *Tetrigidae* the epiphallus is absent ; the pseudosternite, described by Walker (1922), cannot be regarded as homologous with the epiphallus of *Acridoidea* and probably represents a structure of a different origin. The cingulum, in the same meaning as in *Acridoidea,* is also absent. The penis is directed towards the anterior end of the body, whereas in *Acridoidea* it is always directed towards the posterior end. The family *Trigonopterygidae* is the only exception ; in it the penis is directed towards the anterior end, as a secondary phenomenon, the whole phallic complex being in a reversed position ; the ventral part being in a dorsal position and the dorsal part ventral (see Dirsh, 1956.) The whole phallic organ in *Tetrigidae* is covered above with valves, which are absent in *Acridoidea.*

3. The elytra in *Tetrigidae* are strongly shortened, scale-like, while the wings are fully developed (though there are some apterous species). This never occurs in *Acridoidea.* The hind wing has a strongly reduced remigium, a relatively large vannus and unbranched main veins (Ragge, 1955).

4. The tympanal organ is always absent in *Tetrigidae.* In *Acridoidea,* except a few families, it is present.

5. The anterior and middle tarsi of *Tetrigidae* consist of two segments and only the hind tarsus is three-segmented, while in *Acridoidea* all tarsi are always three-segmented.

6. Arolia are absent in *Tetrigidae* but always present in *Acridoidea.*

All these characters separate *Tetrigidae* from *Acridoidea* definitely and it is probable that the internal anatomy, when studied, will provide further important features of difference.

TAXONOMIC CHARACTERS

The attitude of taxonomists of the last and the beginning of this century towards classification of *Acridoidea* was to regard the genera and species as being related if they resembled each other in general appearance. However, such resemblance, often due to convergent adaptation to habitat and mode of life, is often deceptive, and many superficially similar genera proved to be quite unrelated when their external and some internal characters were compared in detail.

For example, the genera *Acrida* and *Truxalis,* which are superficially similar and were usually regarded as closely related, actually belong to clearly distinct subfamilies. *Mesopsis* and *Mesopsera* were also regarded as related, but the first belongs to the subfamily *Truxalinae* and the second to *Hemiacridinae*. *Batrachotetrigini* were regarded as a part of *Oedipodinae*, to which they are superficially similar, but it is undisputed now that they belong to the family *Pamphagidae*.

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[1] Only the family *Tetrigidae,* not the whole suborder *Tetrigoidea,* is compared here with *Acridoidea,* since it is only this family, not the whole suborder, that was regarded as belonging to the *Acridoidea.*

The characters used for differentiation of families and subfamilies will be seen from the diagnoses and the table below, but a few explanatory remarks are necessary.

Chopard (1920) was the first to introduce the structure of the internal, mainly male, genitalia for the purpose of systematics. Since then genitalia have been used by a few other authors, as supplementary characters for the differentiation of species and genera. On a wider scale, for characterizing higher groups, male genitalia were used by Roberts (1941), Uvarov (1943) and Dirsh (1956) and the female genitalia by Slifer (1939–43) and Dirsh (1957).

It may be suggested that the male genitalia represent one of the most reliable characters for the classification of higher taxonomic units, because they are less subject to the adaptive changes of the organism in changing environmental conditions than are the external structures.

For the differentiation of families the phallic complex is certainly most reliable and can be used as a single character. Up to the present time, no intermediate forms which might suggest transition from one family to another, have been found. It serves by itself to define some subfamilies, e.g. *Euryphyminae*, *Calliptaminae*, *Eremogryllinae* and *Hemiacridinae*, or it may be used as an auxiliary character. It displays a considerable diversity at the generic level and sometimes may be used for separation of species.

Other internal characters, e.g. the Comstock-Kellogg glands, alimentary canal, malpighian tubes, nervous system, internal skeleton, muscles, chromosomes, etc., may offer characters of value, but too few species have been studied in these respects for use to be made of them for taxonomic purposes at present.

The second important character recently introduced into the systematics of *Acridoidea* is the stridulatory mechanism. The ability of some grasshoppers to produce sounds detectable by the human ear was known from time immemorial, but the relations between the types of the sound-producing mechanisms and taxonomy were not stressed until comparatively recently. A variety of structures serving for stridulation has been described (Uvarov, 1928, 1942 ; Chopard, 1938 ; Henry, 1942 ; Burtt, 1946 ; Kevan, 1953–54 ; Dirsh, 1955) and it is clear that they have important taxonomic value. Such structures exist in the majority of families and subfamilies, while their regular absence in others also appears characteristic.

In the majority of cases, the stridulatory mechanism provides additional taxonomic evidence for systematic groups, based on other characters. In some groups it even provides the main character when others are less adequate or are obscured by convergence, general reduction, etc.

The most important point is the principle of the structure of the stridulatory mechanism. For example : the males of *Tanaoceridae*, *Pneumoridae* and *Xyronotidae* have a combination of ridges on the sides of the third abdominal tergite with a serrated or non-serrated ridge on the internal side of the hind femora. In the majority of subfamilies of the family *Acrididae* the mechanism is based on the friction between the elytra and hind legs. In *Truxalinae* and *Eremogryllinae* this

TABLE II.—*Families and their Main*

	Internal characters							
Families	Cingulum	Valves of penis	Sacs	Epiphallus	Oval sclerites	Comstock-Kellogg glands*	Ileal caeca*	Chromosomes†
Eumastacidae	Absent	Single sclerited	Ejaculatory sac without pockets	Variable	—	—	+	Small
Proscopiidae	Primitive	Single sclerited	Ditto	Bridge-shaped	—	—	—	,,
Tanaoceridae	,,	?	?	Plate-shaped	—	?	?	?
Pneumoridae	,,	Paired not divided	Ejaculatory sac without pockets	Ditto	—	?	?	Small
Xyronotidae	,,	?	?	,,	—	?	?	,,
Trigonopterygidae	,,	Paired divided	Ejaculatory sac without pockets	,,	—	?	?	,,
Charilaidae	Differentiated	Ditto	Ditto	,,	—	?	?	?
Pamphagidae	,,	,,	,,	,,	—	—	—	Large
Lathiceridae	Shield-like	,,	,,	Bridge-shaped	+	?	?	?
Pyrgomorphidae	Capsule-like	Paired not divided	,,	Ditto	—	—	—	Large
Ommexechidae	Differentiated	Ditto	Ejaculatory sac with pockets	Bridge-shaped with separated lateral plates	+	+	—	Small
Pauliniidae	Ditto	Paired divided	Ditto	Ditto	+	+	?	,,
Lentulidae	,,	Paired not divided	Ejaculatory sac without pockets	Bridge-shaped	+	—	?	,,
Acrididae	,,	Paired divided or flexured	Ditto	Variable	+	+ or —	—	Medium

* According to Slifer (1939–43).
† According to Helwig (1958).

type of mechanism is represented by the sharpened veins of the elytra and a serration (with articulated or non-articulated pegs) on the internal side of the hind femora. In the group *Oedipodini* of *Acridinae* it consists of a serrated intercalary vein of the elytra and a sharp ridge on the internal side of the hind femora. In *Romaleinae* it is represented by serrated veinlets on the hind wings and sharpened veins on the lower surface of the elytra. In *Hemiacridinae* it is a combination of the thickened

Characters (+ *Present,* − *Absent*)

External characters									
Abdomino-femoral stridulatory mechanism	Tube-like pro-thorax	Hind legs	Brunner's organ	Basal lobes of hind femur	Fasti-gial furrow	Antennal grooves	Median carina of pronotum	Elytra and wings	Tympanum
−	−	Saltatorial	+	Variable	+ or −	−	Single or absent	+ or −	−
−	+	Almost cursorial	−	Lower lobe longer	−	−	Ditto	Mainly −	−
+	−	Saltatorial	+	Ditto	−	−	Single	−	−
+	−	Almost cursorial	−	,,	+	−	,,	+	−
+	−	Saltatorial	+	Lower lobe shorter	+	−	,,	−	−
−	−	,,	+	Ditto	+	−	,,	+	−
−	−	,,	+	Lower lobe longer	+	−	Double	+	+
−	−	,,	+	Ditto	+	−	Single or absent	+ or −	Normally +
−	−	,,	+	,,	+	+	Ditto	−	−
−	−	,,	+	,,	+	−	,,	+ or −	Normally +
−	−	,,	+	Of equal length	+	−	,,	+ or −	+ or −
−	−	,,	+	Lower lobe shorter	−	−	Single	+	+
−	−	,,	+	Ditto	−	−	Single or absent	−	−
−	−	,,	+	Lower lobe shorter or both of equal length	−	−	Ditto	+ or −	+ or −

veinlets of the elytra with the spines and spurs of the hind tibiae. There are other main types of the mechanism, and their modifications in some genera of the known subfamilies and families may provide useful auxiliary characters.

It is necessary to bear in mind that in some genera and species the stridulatory mechanism may be lost or reduced (particularly in females), but its loss is a secondary phenomenon often connected with the reduction or loss of wings. It should be noted also that analogous structures may appear as an exception in unrelated genera of different subfamilies and families, but this happens with almost every external character. As an example of such analogous development, the serration on the internal side of the hind femora in the two South American genera *Atrachelacris* and *Leiotettix* of the *Catantopinae* may be cited. The serration is somewhat similar to that in *Truxalinae*, but it is not accompanied by the specialization of the veins of the elytra. The genera nearest to *Atrachelacris* and *Leiotettix* have no serration at all.

At the present stage of knowledge of *Acridoidea* it is not possible to estimate the phylogenetic value of the majority of external morphological characters ; even their purpose is unknown. In consequence it is not possible to say that any external character is more, or less, important than any other. The way they are used in classification is mainly a matter of convenience. Thus although the stridulatory mechanism is not necessarily more valuable than the other external characters, it offers useful diagnostic features which cannot be ignored. The biological significance of stridulation is great, since it is largely connected with sexual activity, which makes it important for the survival of the species.

A further useful character, introduced by Uvarov (1943), is the structure of the hind femur. It is useful in differentiation of certain families and subfamilies (see Tables II and III). The lower basal lobe of the hind femur may be longer or shorter than, or equal to, the upper. This character, however, has no absolute value, since intermediate forms occur in unrelated groups, but it is valuable if considered in combination with other features.

The next important character is a deep, short, median furrow on the apex of the fastigium of the vertex, which is, in most cases, a direct continuation of the sulcus of the frontal ridge. Whether it is homologous with the epicranial suture of other insects or is a secondary phenomenon is not relevant here. This furrow, first noticed by Stål (1876), and later mentioned by Rehn (1938), as characteristic for *Pamphagidae*, was introduced as a character of great value by Uvarov (1943) for that family and *Pyrgomorphidae*. Now it can be extended to *Trigonopterygidae*, *Charilaidae*, *Lathiceridae*, *Xyronotidae* and *Pneumoridae*. It is, however, not an absolute character, since in some *Pamphagidae* and others in which the head approximates to globular, it has a secondary tendency to disappear, while it occasionally appears in quite unrelated genera of *Acrididae*.

Helwig (1958) suggested, as a taxonomic character for families, the size of chromosomes, dividing the families into groups, with small, medium and large chromosomes (see Table II). It is difficult to estimate the real value of this character since too few genera have been studied.

The following general considerations are used here as a basis for the division of *Acridoidea* into families and subfamilies. A family is regarded as a group of genera possessing characters which do not occur in other groups or some of which occur in different combinations ; there are no living genera intermediate between the families. A subfamily is regarded as a group of genera with one or more convenient characters, or a combination of characters, which do not normally occur in other groups of genera of the family, but are not exclusive, so that the occurrence of intermediate genera is possible.

LIST OF FAMILIES

Order *Orthoptera*

Suborder *Acridoidea*

1. Family *Eumastacidae*
2. ,, *Proscopiidae*
3. ,, *Tanaoceriidae*
4. ,, *Pneumoridae*
5. ,, *Xyronotidae*
6. ,, *Trigonopterygidae*
7. ,, *Charilaidae*
8. Family *Pamphagidae*
9. ,, *Lathiceridae*
10. ,, *Pyrgomorphidae*
11. ,, *Ommexechidae*
12. ,, *Pauliniidae*
13. ,, *Lentulidae*
14. ,, *Acrididae*

KEY TO FAMILIES

The following key to families is based on external characters alone, but it must be remembered that in some cases male genitalia provide the decisive character and these are mentioned in the respective family diagnoses.

1 (2) Frons mostly flattened. Cubital vein of elytron and medial vein of hind wing unbranched. Antenna, on lower apical part, usually with small tubercle (antennal organ). Basal segment of hind tarsus with serrated margins, or with basal, or apical, or both external teeth or at least with a basal external tubercle . . . . *Eumastacidae*

2 (1) Frons of variable shape. Cubital vein of elytron and medial vein of hind wing usually branched. Antennal organ mostly absent. Basal segment of hind tarsus never serrated, never with teeth or tubercle.

3 (4) Body stick-like. Prothorax tube-like, with lower margins of lateral lobes of pronotum fused with prosternum. Brunner's organ absent . *Proscopiidae*

4 (3) Body usually not stick-like. Prothorax not tube-like, with lower margins of lateral lobes of pronotum not fused with prosternum. Brunner's organ present (in *Pneumoridae* vestigial or absent).

5 (10) Abdomino-femoral stridulatory mechanism, represented by ridges on the third abdominal tergite and a ridge on internal side of hind femur, present in males.

6 (7) Antenna in male longer than, in female about as long as, body. Abdominal part of stridulatory mechanism represented by curved cylindrical ridge covered with fine transverse ridgelets; ridge on internal side of hind femur not serrated . . . . *Tanaoceridae*

7 (6) Antenna in both sexes much shorter than body. Abdominal part of stridulatory mechanism represented by a row of short, sharp ridges; ridge on internal side of hind femur serrated.

8 (9) Body stout, in males strongly inflated. Head with flattened vertical frons. Brunner's organ vestigial or absent. Male macropterous, female with reduced wings . . . . *Pneumoridae*

9 (8) Body slender, compressed. Head acutely conical. Brunner's organ present. Completely apterous . . . . *Xyronotidae*

10 (5) Abdomino-femoral stridulatory mechanism absent.

11 (22) Fastigial furrow present.

12 (13) Lower basal lobe of hind femur shorter than the upper. Elytron widening towards apex . . . . *Trigonopterygidae*

13 (12) Lower basal lobe of hind femur longer than or as long as the upper. Elytron not widening towards apex.

14 (21) Lower basal lobe of hind femur longer than the upper.

15 (16) Antennal grooves present . . . . *Lathiceridae*
16 (15) Antennal grooves absent.
17 (18) Median carina of pronotum double . . . . *Charilaidae*
18 (17) Median carina of pronotum single or absent.
19 (20) Head of variable shape, but not acutely conical. Apical fastigial areas absent. Krauss's organ mostly present . . . . *Pamphagidae*
20 (19) Head acutely conical, with regularly incurved frons. Apical fastigial areas mostly present. Krauss's organ absent . . . . . . *Pyrgomorphidae*
21 (14) Lower basal lobe of hind femur as long as upper one . . . *Ommexechidae*
22 (11) Fastigial furrow absent.
23 (24) Completely apterous. Tympanum absent. . . . . *Lentulidae*
24 (23) Fully winged or with reduced wings, or apterous. Tympanum usually present, if absent, then body depressed.
25 (26) Medial vein of elytron unbranched. Ocelli very large. Hind tibia with strongly expanded lateral margins . . . . *Pauliniidae*
26 (25) Medial vein of elytron usually branched. Ocelli comparatively small. Lateral margins of hind tibia not expanded, slightly expanded or rarely strongly expanded . . . . *Acrididae*

Family *Eumastacidae*

(Text-figs. 1, 2)

Type genus : *Eumastax* Burr, 1899

Body of variable shape. Head of variable shape, with frons mostly flattened. Antenna on lower apical part usually with tubercle-like antennal organ. Prosternal process absent. Lower basal lobe of hind femur longer or shorter than upper one. Brunner's organ present. Basal segment of hind tarsus with serrated upper margins or with basal, or apical, or with both external teeth, or at least with basal external tubercle. Elytra and wings fully developed, reduced or absent ; cubital vein of elytra and medial vein of hind wing unbranched. Ectophallus relatively large, not forming cingulum. Endophallus small, with single-sclerited penis. Epiphallus of variable shape. Oval sclerites absent. Ileal caeca present. Stridulatory mechanism not known.

In the structure of the phallic complex the family *Eumastacidae* differs so strongly from other families of *Acridoidea* that they can hardly be regarded of the same rank. However, temporarily, it is advisable to keep them in their present status until more data are available. A sac-like ectophallus without a cingulum is possibly a primitive feature, which does not occur in other families ; on the other hand, sometimes the complicated structure of the ectophallus indicates a high specialization but in a different direction from that in other *Acridoidea*. The primitiveness is suggested also by the small, and in most cases, comparatively simple, endophallus, with penis of a single sclerite. In higher *Acridoidea* the endophallus is complicated and, except in *Proscopiidae*, always with a two-sclerited penis.

Another internal character, which according to Slifer (1944), occurs only in *Eumastacidae*, is the presence of ileal caeca in the form of six appendices attached to the hindgut of the alimentary canal.

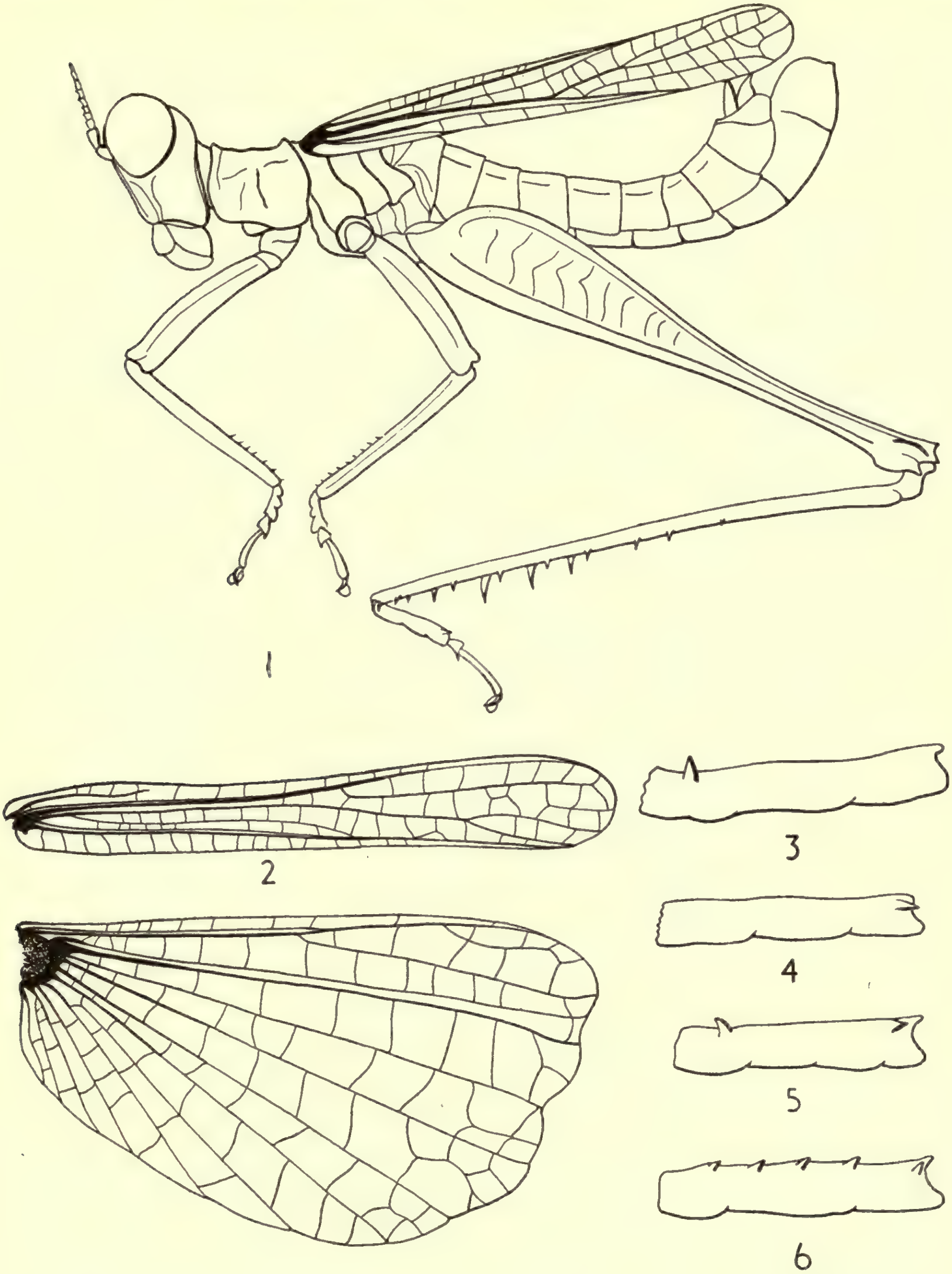

FIG. 1. 1. *Eumastax surda* Burr, whole insect. 2. The same, elytron and wing. 3–6. Basal tarsal segment. 3. *Biroella*. 4. *Eumastax*. 5. *Pseudothericles*. 6. *Chorotypus*.

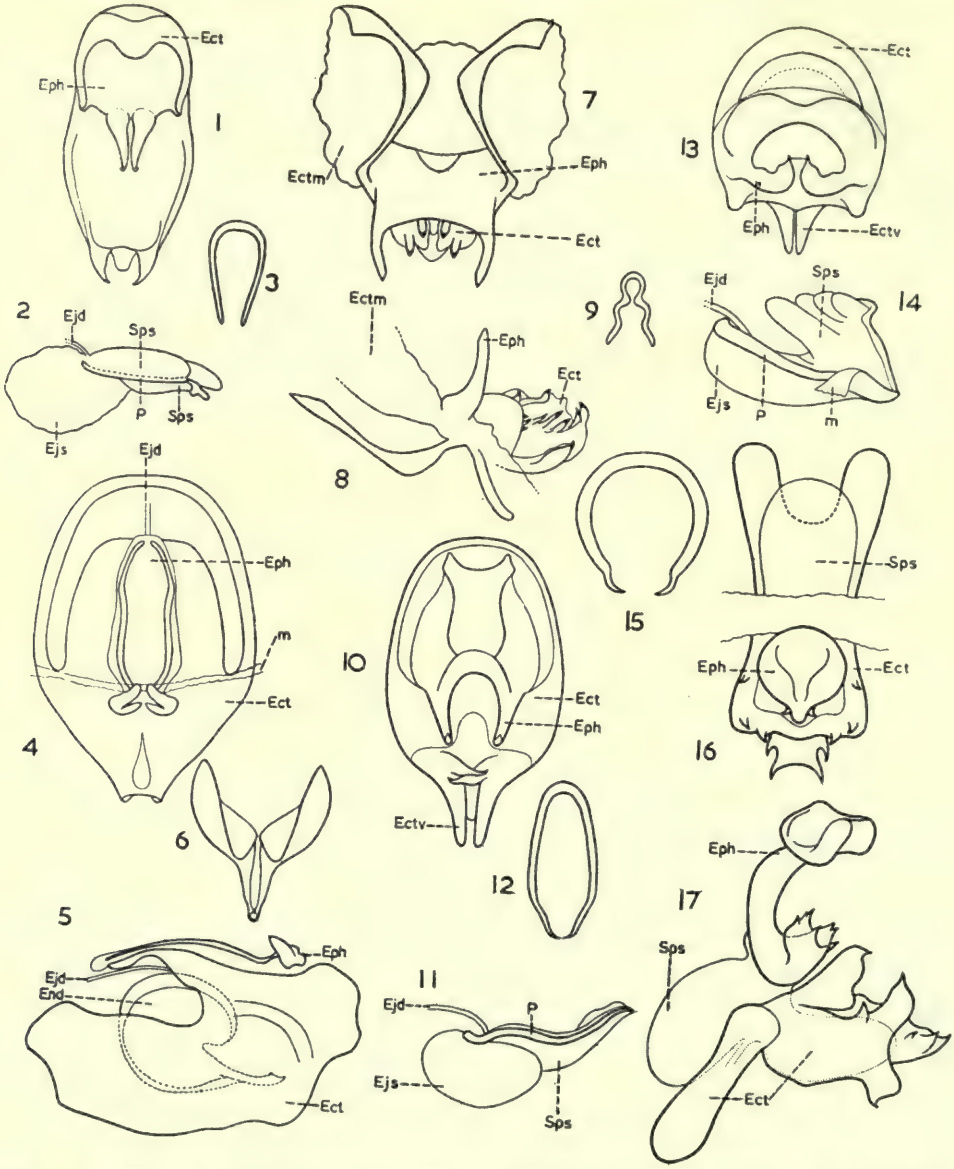
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FIG. 2. Examples of the phallic complex in *Eumastacidae*. 1–3. *Moraba* sp. 1. Phallic complex from above. 2. The same in profile. 3. Penis from above. 4–6. *Euschmidtia burri* Uv. 4. Phallic complex from above. 5. The same in profile. 6. Penis from above. 7–9 *Erucius dimidiatipes* I. Bol. 7. Phallic complex from above. 8. The same in profile. 9. Penis from above. 10–12 *Biroella gracilis* C. Bol. 10. Phallic complex from above. 11 The same in profile. 12. Penis from above. 13–15. *Gomphomastax clavata* (Ostr.). 13. Phallic complex from above. 14. The same in profile. 15. Penis from above. 16, 17. *Erianthus guttatus* (Westw.). 16. Phallic complex from above. 17. The same in profile.

The external characters of value are the unbranched cubital vein of the elytron and the unbranched median vein of the hind wing (Ragge, 1955). However, the *Eumastacidae* share the former character with *Ommexechidae*, *Pauliniidae* and some *Pyrgomorphidae*, and it occurs also in some *Catantopinae* with shortened elytra.

The presence of teeth or a tooth, or at least a tubercle, on the basal segment of the hind tarsus is a character which occurs only in *Eumastacidae* and not in any other family of *Acridoidea*.

Rehn (1948) divided the family *Eumastacidae* into seventeen subfamilies. Since then, one subfamily (*Tanaocerinae*) has been removed and raised to family rank (Dirsh, 1955) and one new subfamily *Socotrellinae* Popov, 1957, described. In 1958 Rehn and Grant erected three more subfamilies. However, the main character of the family, the phallic complex, is so divergent in certain subfamilies that a wider separation than at the subfamily level appears probable, while some other subfamilies suggest closer interrelations. It would be premature to attempt a reclassification of them, because only a few of the known genera have been studied in respect of the phallic complex. At present it is more practical to regard the group temporarily as one very heterogeneous family.

LIST OF SUBFAMILIES OF EUMASTACIDAE

(Alphabetical order)

1. *Biroellinae*
2. *Chininae*
3. *Chorotypinae*
4. *Episactinae*
5. *Eruciinae*
6. *Espagnolinae*
7. *Eumastacinae*
8. *Euschmidtiinae*
9. *Gomphomastacinae*
10. *Malagassinae*
11. *Mastacideinae*
12. *Miraculinae*
13. *Morabinae*
14. *Morseinae*
15. *Paramastacinae*
16. *Pseudomastacinae*
17. *Socotrellinae*
18. *Teicophryinae*
19. *Temnomastacinae*
20. *Thericleinae*

Family ***Proscopiidae***

(Text-fig. 3)

Type genus: *Proscopia* Klug, 1820

Body stick-like. Basi-occipital slit of head present. Pronotum with reduced lateral lobes, lower margins of which are fused with prosternum, whole prothorax representing a tube-like structure. Prosternal process absent. Elytra and wings absent (rarely present but strongly reduced). Tympanum absent. Hind legs almost cursorial. Brunner's organ absent. External apical spine of hind tibia present. Phallic complex with differentiated ectophallus; cingulum primitive. Endophallus strongly specialized; penis single-sclerited. Epiphallus bridge-shaped; oval sclerites absent. Stridulatory mechanism not found.

All the characters of *Proscopiidae* indicate absence of close relationship with any other known family. The loss or great reduction of the wings and the reduction of the hind legs to almost cursorial condition, and the absence of Brunner's organ, make comparisons more difficult. The phallic complex, with primitive cingulum and highly complicated endophallus, represents a blend of primitive and specialized characters but no other anatomical studies are available. The only suggestion which may be made is that the family represents a very early branch of unknown pre-acridoid stock, and is possibly remotely related to *Eumastacidae*.

Distributed in South America.

For scope of the family see Mello-Leitão, 1939.

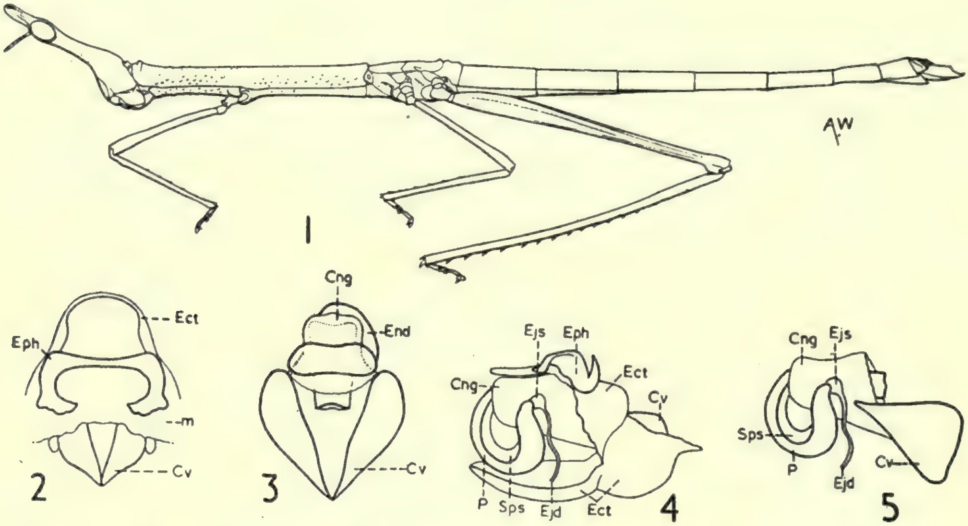

FIG. 3. *Proscopia scabra* Klug. 1. Whole insect. 2–5. Phallic complex. 2. From above. 3. The same, but ectophallic membrane and epiphallus removed. 4. In profile. 5. The same, but ectophallic membrane and epiphallus removed.

Family *Tanaoceridae*

(Text-fig. 4)

Type genus : *Tanaocerus* Bruner, 1906

Antenna in male longer, in female only slightly shorter than body. Head subspheroidal. Prosternal process absent. Elytra, wings and tympanum absent. On the sides of third abdominal tergite of male there is thick, cylindrical ridge, densely covered with fine transverse ridgelets (part of stridulatory mechanism). Lower basal lobe of hind femur longer than upper one. External apical spine of hind tibia present. Male subgenital plate composed of several separate sclerites, connected by membrane. Poorly developed cingulum of phallic organ present. Epiphallus disc-shaped, without ancorae and lophi. Oval sclerites absent.

When the first genus of the family, *Tanaocerus* Bruner, 1906, was described it was referred to *Eremobiinae*. Later Rehn (1948) placed it and the second known genus into the family *Eumastacidae* and erected for them the subfamily *Tanaocerinae*.

When the peculiar stridulatory mechanism was found in the male *Tanaocerus*, the subfamily was raised to family rank (Dirsh, 1955).

The differences of this family from *Eumastacidae* and other *Acridoidea* are extremely striking. The peculiar stridulatory mechanism, one part of which is a ridge covered with ridgelets on the sides of the third abdominal tergite and another part is a short, sharp ridge on the internal side of the hind femur, is shared only with *Pneumoridae* and *Xyronotidae*, with which there is otherwise no relationship. The *Eumastacidae*, to which *Tanaoceridae* was previously referred, have no stridulatory mechanism. A subspheroidal head, as in *Tanaocerus*, is not found in *Eumastacidae*. Such peculiarly long antennae as in *Tanaocerus* do not occur in any other family of *Acridoidea*. The peculiar structure of the male subgenital plate of *Tanaocerus* is also not found in other families.

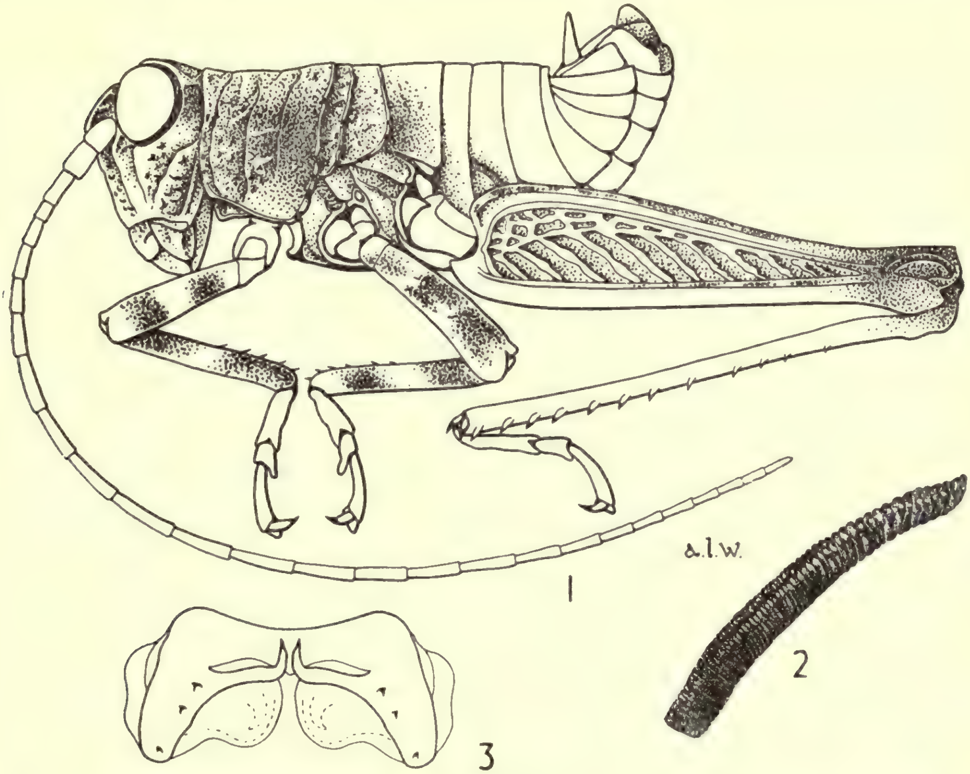

FIG. 4. *Tanaocerus koebelei* Bruner. 1. Whole insect, male. 2. Abdominal part of the stridulatory mechanism. 3. Epiphallus.

The phallic complex of the family is not yet sufficiently studied, but the available data suggest that it is very characteristic. The presence of a primitive cingulum also suggests that *Tanaoceridae* differ widely from *Eumastacidae*, which have no cingulum. All these considerations indicate that the family *Tanaoceridae* is sharply different from other families of *Acridoidea*.

The family occurs only in the south-west part of North America.

List of known genera :

1. *Mohavacris* Rehn, 1948
2. *Tanaocerus* Bruner, 1906

Family *Pneumoridae*

(Text-fig. 5)

Type genus : *Pneumora* Thunberg, 1775

Male body strongly inflated. Head short, with shortened fastigium of vertex ; face flattened, vertical, frontal ridge absent ; fine fastigial furrow present. Ocelli located internally or externally to bases of antennae. Prosternal process absent. Venation primitive ; elytra without vannal fold, hind wing with remigium almost as large as vannus. Tympanum absent. Stridulatory mechanism in male represented by a row of transverse ridges on the sides of third abdominal tergite and serrated ridge on internal side of hind femur. Hind legs almost cursorial ; lower basal lobe of hind femur longer than upper one ; Brunner's organ vestigial or absent. Phallic complex primitive ; ectophallus sac-like ; cingulum rudimentary ; penis rudimentary, paired, valves not divided. Epiphallus plate-like, without lophi and ancorae ; oval sclerites absent.

The family *Pneumoridae* is so different from other families of *Acridoidea*, that there is no doubt of its isolated position. It shares, however, some features of stridulatory mechanism, as well as a similar type of epiphallus, with *Tanaoceridae* and *Xyronotidae*. The latter character is shared with *Charilaidae*, *Pamphagidae* and *Trigonopterygidae* also.

The primitive phallic complex and wing venation suggest that the family probably represents a surviving branch of very ancient *Acridoidea*.

By the shape of the epiphallus and spermatheca and the position of the ocelli the family is sharply divided into two groups, one consisting of the genera *Pneumora* and *Physophorina* and the other of the genera *Physemacris*, *Bullacris* and *Prostalia*.

The family is distributed in South Africa and in East Africa, as far north as Uganda.

List of known genera :

1. *Bullacris* Roberts, 1941
2. *Physemacris* Roberts, 1941
3. *Physophorina* Westwood, 1874
4. *Pneumora* Thunberg, 1775
5. *Prostalia* I. Bolivar, 1906

Family *Xyronotidae*

(Text-fig. 6)

Type genus : *Xyronotus* I. Bolivar, 1884

Body laterally compressed. Head conical. Fastigial furrow present. Prosternal process present. Elytra, wings and tympanum absent. Lower basal lobe of hind

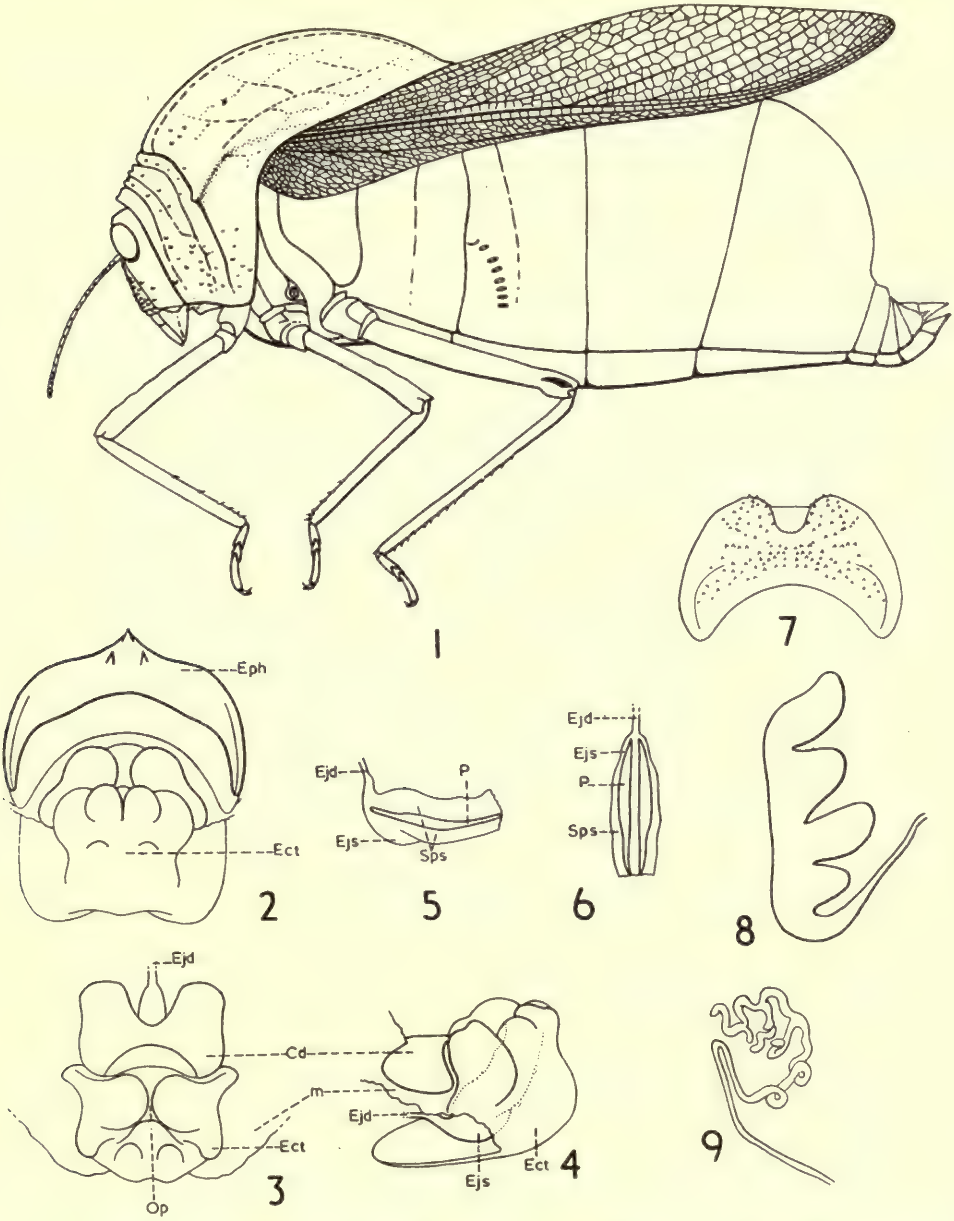
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FIG. 5. 1. *Bullacris longicornis* (St.), whole insect. 2–6. Phallic complex of *Physemacris variolosa* (L.). 2. From above. 3. Dorso-distal view. 4. In profile. 5. Endophallus in profile. 6. The same from above. 7. Epiphallus of *Pneumora inanis* (F.). 8–9. Spermatheca. 8. *Pneumora inanis* (F.). 9. *Bullacris longicornis* (St.).

femur shorter than upper one. Brunner's organ present. External apical spine of hind tibia present. Sides of third abdominal tergite of male with a row of sharp, small, transverse ridges (part of stridulatory mechanism, the other part being serrated ridge on internal side of hind femur). Ectophallus weakly differentiated; cingulum primitive. Epiphallus shield-like, without lophi and with pair of projections. Oval sclerites absent.

I. Bolivar (1909) placed the genus *Xyronotus*, which is the only one of the family, into "Sectio Xyronoti" of the family *Pyrgomorphidae*. Kevan (1952) regarded it as a tribe ". . . temporarily attached to the *Trigonopterygidae*". It was raised to family rank by Dirsh (1955).

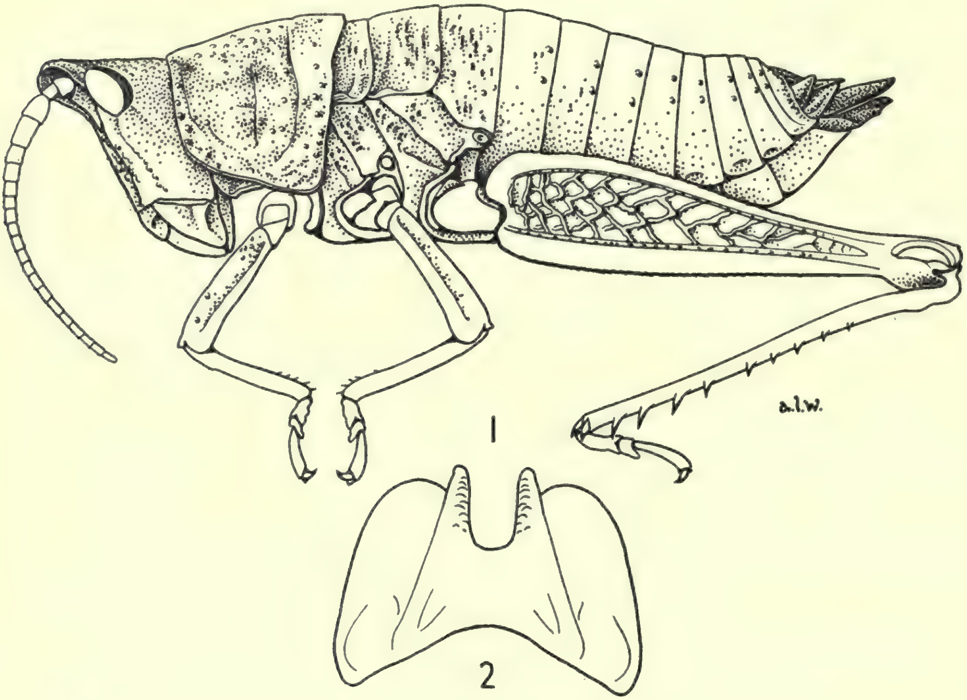

FIG. 6. *Xyronotus aztecus* I. Bol. 1. Whole insect, female. 2. Epiphallus.

As can be seen from the diagnosis, there are several characters, like the presence of the fastigial furrow and the shape of the hind femur, which *Xyronotus* shares with other families, but the stridulatory mechanism is extremely peculiar, similar to that in *Pneumoridae* and *Tanaoceridae*, to which *Xyronotidae* are not otherwise related. The mechanism and the primitive phallic complex do not permit *Xyronotus* to be placed into any known family and there is no alternative to regarding it as the only known genus of a distinct family.

The only genus, *Xyronotus* I. Bolivar, 1884, occurs in Mexico.

Family ***Trigonopterygidae***

(Text-fig. 7)

Type genus : *Trigonopteryx* Charpentier, 1841

Body strongly laterally compressed. Head conical. Fastigial furrow present. Prosternal process present. Elytra widening towards apex, with radial and medial veins fused. Remigium of hind wings almost as wide as vannus. Tympanum absent. Lower basal lobe of hind femur shorter than upper one. Brunner's organ present. External spine of hind tibia present. Phallic complex in reversed position, dorsal side turned ventrad, with penis directed towards anterior end of body and epiphallus located on ventral side. Ectophallus differentiated and strongly specialized ; cingulum well developed ; valves of penis paired, divided. Epiphallus plate-like. Oval sclerites absent. No stridulatory mechanism known.

Westwood (1841), who described the genus *Systella*, placed it " between *Truxalides* and *Conophori* ". Walker (1870) regarded the two known genera as a family which he named *Trigonopterygidae*, but I. Bolivar (1884) placed it in *Pyrgomorphinae* as a subtribe and in 1909 referred it to *Pyrgomorphinae* as " sectio *Systellae* ". Dirsh (1952) restored the group as a subfamily *Trigonopteryginae* and in 1956, owing to the peculiar structure of the phallic complex, re-instated it as a family.

The very peculiar, strongly specialized and reversed phallic complex is alone sufficient to separate *Trigonopterygidae* from the other families. The unusual shape of the elytron and wings, the elytron widening towards the apex, with the radius and media fused, and the wide remigium of the hind wing, do not occur in other families except *Pneumoridae*. The combination of a distinct fastigial furrow and the lower basal lobe of the hind femur being shorter than the upper one, occurs only in *Trigonopterygidae* and *Xyronotidae*, but the latter are extremely different in all other respects. All diagnostic features indicate that the family is isolated from the others.

The family is found in Malaya, Australasian Archipelago and Philippines.

List of examined genera :

1. *Systella* Westwood, 1841
2. *Trigonopteryx* Charpentier, 1841

Family ***Charilaidae***

(Text-fig. 8)

Type genus : *Charilaus* Stål, 1875

Body subcylindrical. Head conical. Fastigial furrow present. Pronotum with two parallel median carinae. Prosternal process present. Mesosternal furcal suture curved backwards. Elytra and wings fully developed or reduced. In fully winged forms, wing-elytron stridulatory mechanism present. Tympanum present. Lower basal lobe of hind femur longer than or equal to upper one. Brunner's organ present. External apical spine of hind tibia present. Ectophallus differentiated ;

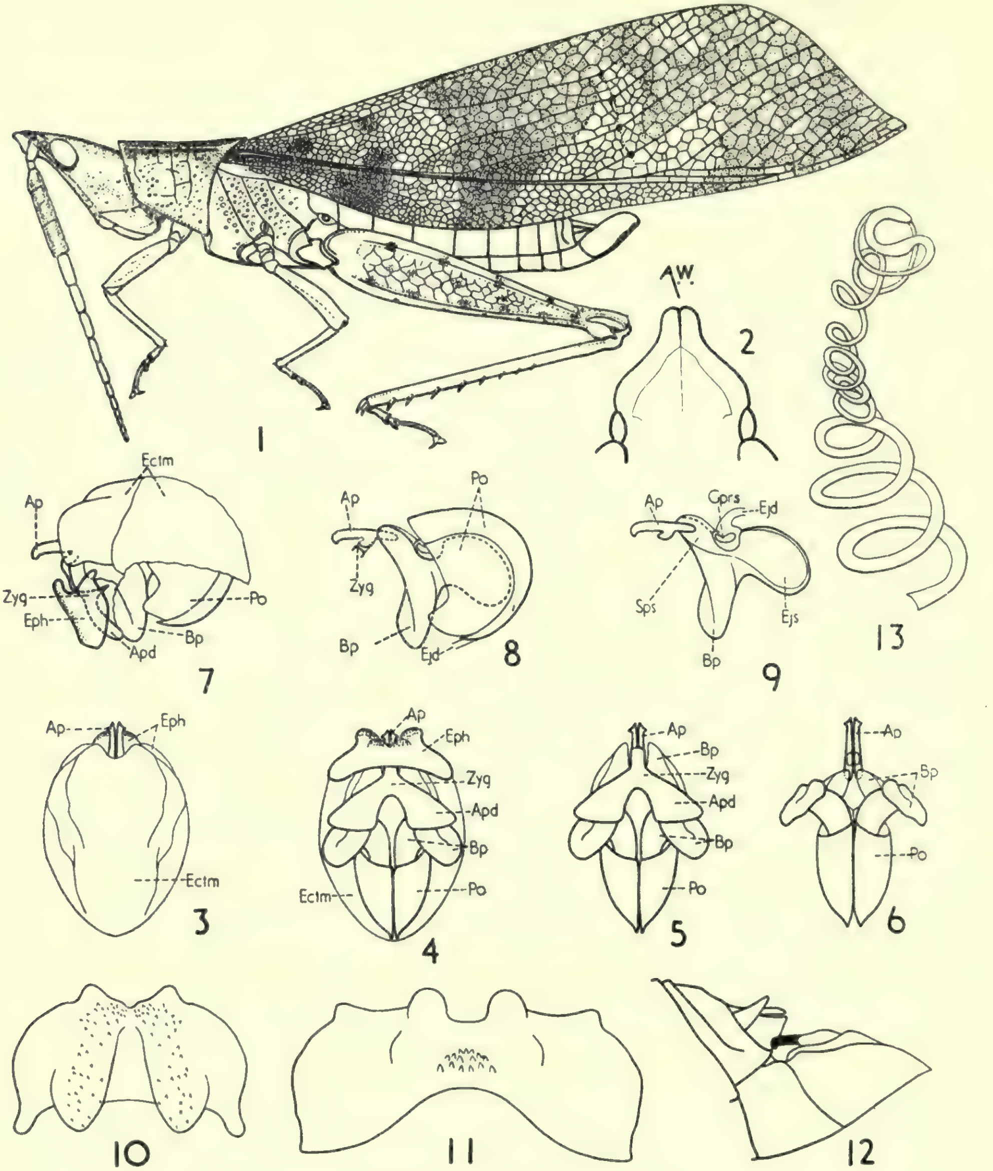
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FIG. 7. *Trigonopteryx hopei* Westw. 1. Whole insect, male. 2. Fastigium of vertex from above. 3–10. Phallic complex. 3. Dorsal view. 4. The same, ventral view. 5. Ventral view, but ectophallic membrane and epiphallus removed. 6. The same, with cingulum removed. 7. Whole phallic complex, in profile. 8. The same, with ectophallic membrane and epiphallus removed. 9. Endophallus, in profile. 10. Epiphallus. 11. Epiphallus of *Systella rafflesii* Westw. 12. End of abdomen of *Trigonopteryx hopei* Westw. in profile, showing the position of penis. 13. Spermatheca of *Systella rafflesii* Westw.

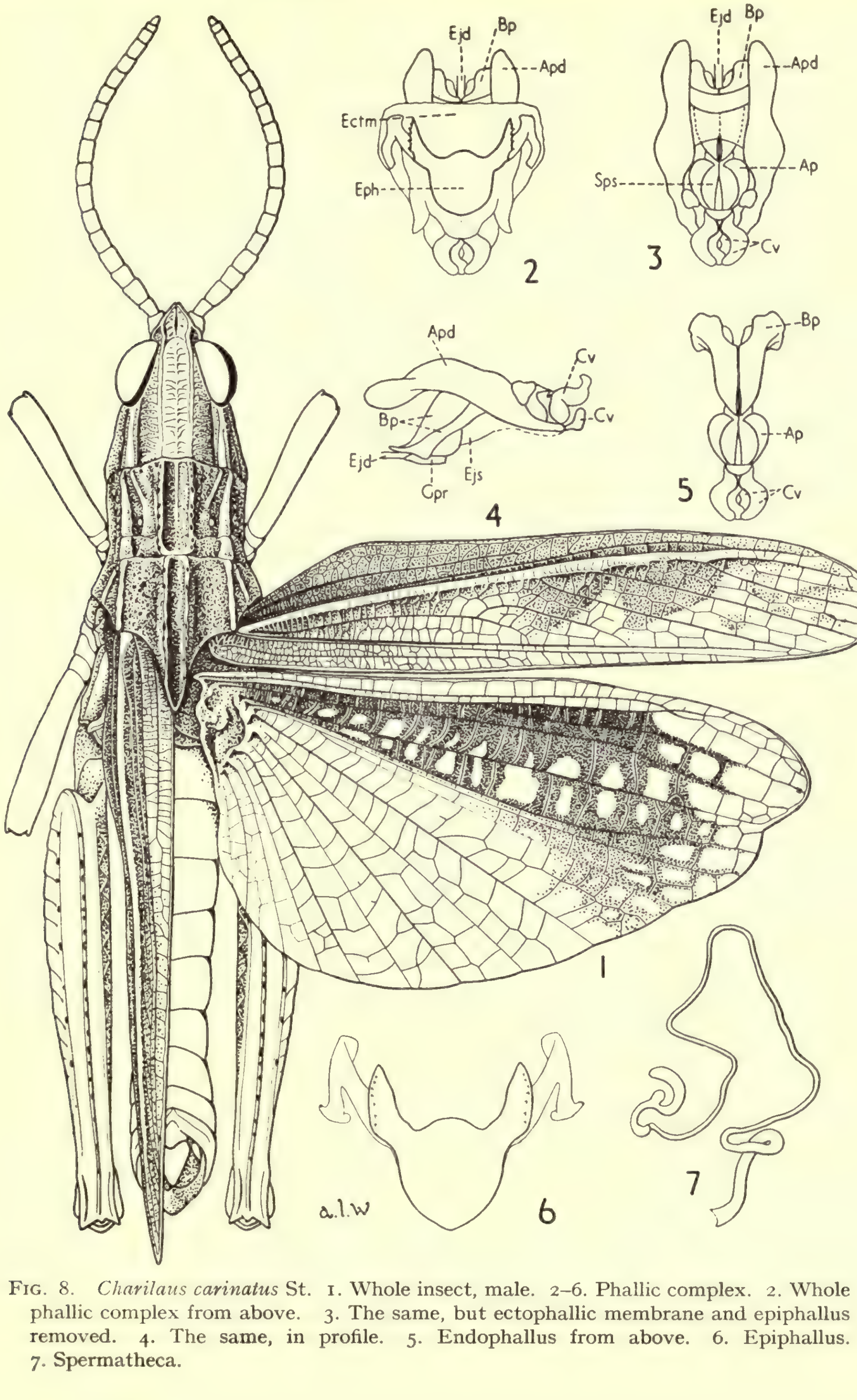
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FIG. 8. *Charilaus carinatus* St. 1. Whole insect, male. 2–6. Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. The same, in profile. 5. Endophallus from above. 6. Epiphallus. 7. Spermatheca.

cingulum differentiated, without zygoma and rami ; with apodemes disconnected ; valves of penis paired, divided ; spermatophore sac dorsal. Epiphallus shield-like, without ancorae and lophi, with ventro-lateral appendices. Oval sclerites absent.

The family *Charilaidae* includes three known genera. The first, *Charilaus*, was placed by Stål (1875) in *Pyrgomorphidae.* Karsch (1896) suggested that it belongs neither to *Pyrgomorphidae* nor to *Pamphagidae* and referred it to " *Caloptenoden* ". Saussure (1889) placed *Charilaus* in *Pamphagidae*, and so did I. Bolivar (1916). Uvarov (1943) suggested that it belongs to the " *Pamphaginae-Pyrgomorphinae* " complex. Dirsh (1953) erected for the group a new subfamily *Charilainae* and in 1956, mainly on the basis of the phallic complex, raised it to family rank.

The phallic complex of *Charilaidae* has very little in common with *Pyrgomorphidae* and approximates more to that in *Pamphagidae*, from which, however, it differs strongly in the disconnected apodemes of the cingulum, the absence of zygoma and rami, and the presence of ventro-lateral appendices of the epiphallus.

The external characters separating *Charilaidae* from *Pamphagidae* and *Pyrgomorphidae* are the double median carina of the pronotum, a character unique in *Acridoidea*, and the type of stridulatory mechanism, which does not occur in the two above-mentioned families.

The family is distributed in S. and SW. Africa.

List of known genera :

1. *Charilaus* Stål, 1875
2. *Hemicharilaus* Dirsh, 1953
3. *Pamphagodes* I. Bolivar 1878

Family ***Pamphagidae***

Type genus : *Pamphagus* Thunberg, 1815

Body of variable shape. Head of variable shape. Fastigial furrow present. Prosternal process present. Mesosternal furcal suture straight. Elytra and wings fully developed, reduced, or absent. Stridulatory mechanism of various types present. Tympanum usually present. Krauss's organ mostly present. Lower basal lobe of hind femur longer than upper one. Brunner's organ present. Ectophallus differentiated ; cingulum differentiated ; valves of penis paired, divided and articulated ; spermatophore sac dorsal. Epiphallus shield-like, with ancorae and without lophi. Oval sclerites absent.

The *Pamphagidae* are a well defined family which has no clear affinity with other *Acridoidea*. In the structure of the phallic complex it has some characters in common with *Charilaidae*, such as the divided valves of the penis, the position of the spermatophore sac and the shape of the epiphallus, but other characters are very different (see *Charilaidae*).

The family is distributed throughout Africa and S. Europe and occurs in mountainous and semi-desert parts of Asia as far as the Far East.

The *Pamphagidae* are divided here into four subfamilies.

Key to Subfamilies of *Pamphagidae*

1 (6) Middle tibia without teeth or tubercles on upper side. If winged, second vannal vein of hind wing not curved and no areas of hind wing expanded

2 (3) Body strongly elongated, comparatively slender, cylindrical. Fastigium of vertex and upper part of frons, strongly projecting forwards. Antenna triangular in cross-section. Epiphallus mostly with deeply excised posterior margin. Krauss's organ absent . . . . . . *Echinotropinae*

3 (2) Body stout, compressed or depressed. Fastigium of vertex moderately or not at all projecting forwards. Antenna of variable shape. Posterior margin of epiphallus not excised. Krauss's organ mostly present.

4 (5) Costal area of elytron (in case of fully developed or shortened elytra) expanded and covered with dense, parallel, ridge-like veinlets (stridulatory specialization). Upper carina of hind femur strongly serrated . . *Porthetinae*

5 (4) Elytra never fully developed, lobiform, lateral, without stridulatory specialization. Upper carina of hind femur smooth, slightly serrated or rarely strongly serrated . . . . *Pamphaginae*

6 (1) Middle tibia on upper side with a row of teeth or tubercles. If winged, second vannal vein of hind wing curved and first and third vannal area expanded *Akicerinae*

Subfam. ***Echinotropinae***

(Text-fig. 9)

Type genus : *Echinotropis* Uvarov, 1944

Body strongly elongated, cylindrical. Integument strongly rugose. Antenna triangular in cross-section, tapering towards apex. Fastigium of vertex and upper part of frons strongly protruding forwards. Pronotum spined or tuberculate. Prosternal process low, collar-like. Elytra fully developed, lobiform, or absent. Tympanum present or absent. Krauss's organ absent. External apical spine of hind tibia present or absent. Epiphallus mostly with deeply excised posterior margin. No stridulatory mechanism known.

The genera of this subfamily represent a natural and a very peculiar group. The most distinctive features are elongate, slender body, which is unusual for *Pamphagidae*, complete absence of Krauss's organ and a characteristic epiphallus, with the posterior end deeply excised in the middle (in two genera).

The subfamily occurs only in S. Africa.

List of known genera :

1. *Echinotropis* Uvarov, 1944
2. *Geloiomimus* Saussure 1899
3. *Thrincotropis* Saussure, 1899

Subfamily ***Porthetinae*** nov.

(Text-fig. 10)

Type genus : *Porthetis* Serville, 1831

Large, with body compressed or depressed. Integument rugose. Antenna compressed, differentiated or tapering towards apex, or ribbon-like. Frons, in profile, with protruding fastigium of vertex or straight. Pronotum from highly crested to flat, depressed. Prosternal process of variable shape. In most cases

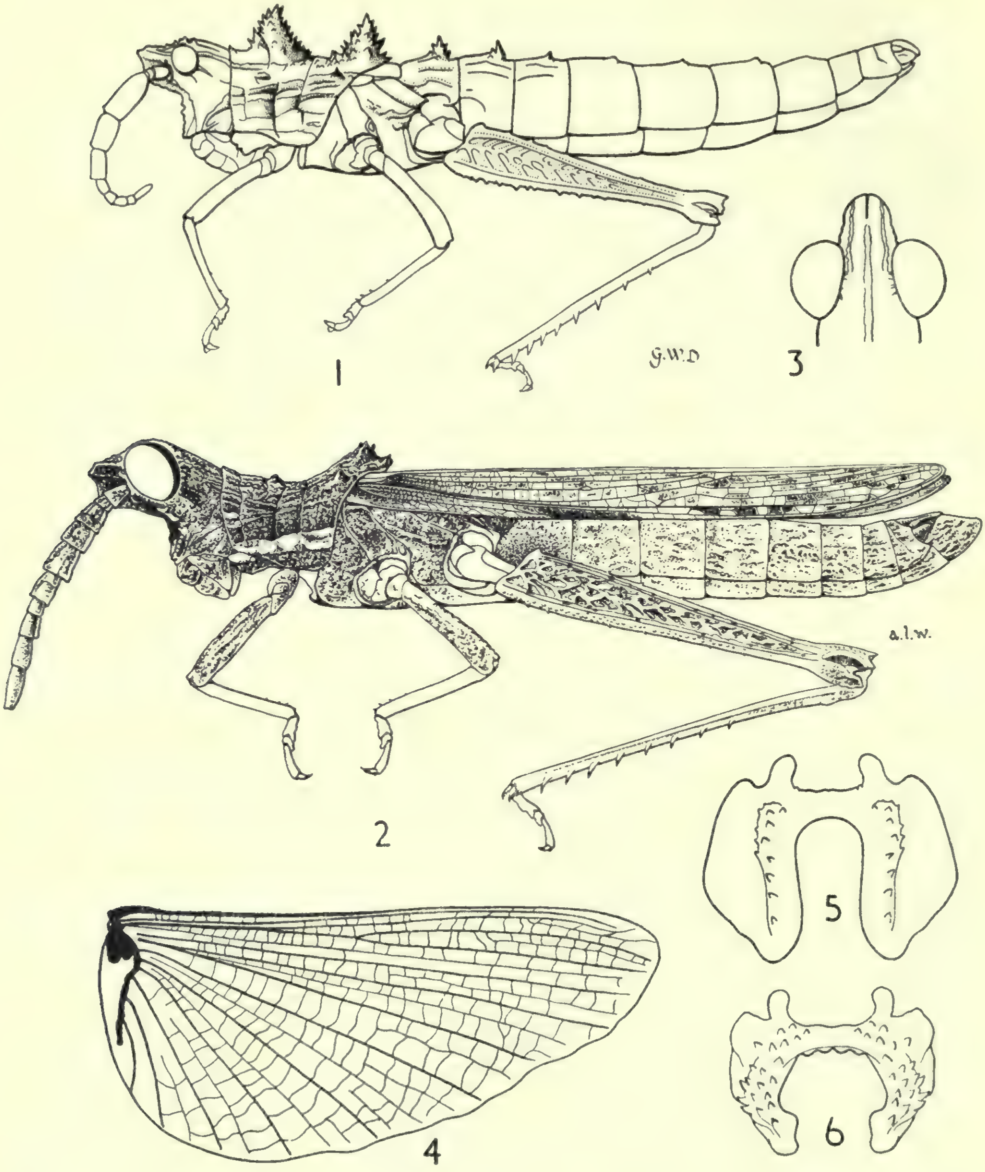

Fig. 9. 1. *Echinotropis horrida* (Sauss.), female. 2–5. *Geloiomimus spinosus* (Dirsh), 2. male. 3. Head from above. 4. Wing. 5. Epiphallus. 6. Epiphallus of *Geloiomimus nasicus* Sauss.

males winged, females wingless. Costal area of elytron (except *Bolivarella* with small lobiform elytra) expanded and provided with dense, parallel, ridge-like stridulatory veinlets. Krauss's organ present. Tympanum present, open, without subtympanal lobe. External apical spine of hind tibia present. Apical valves of penis mostly serrated.

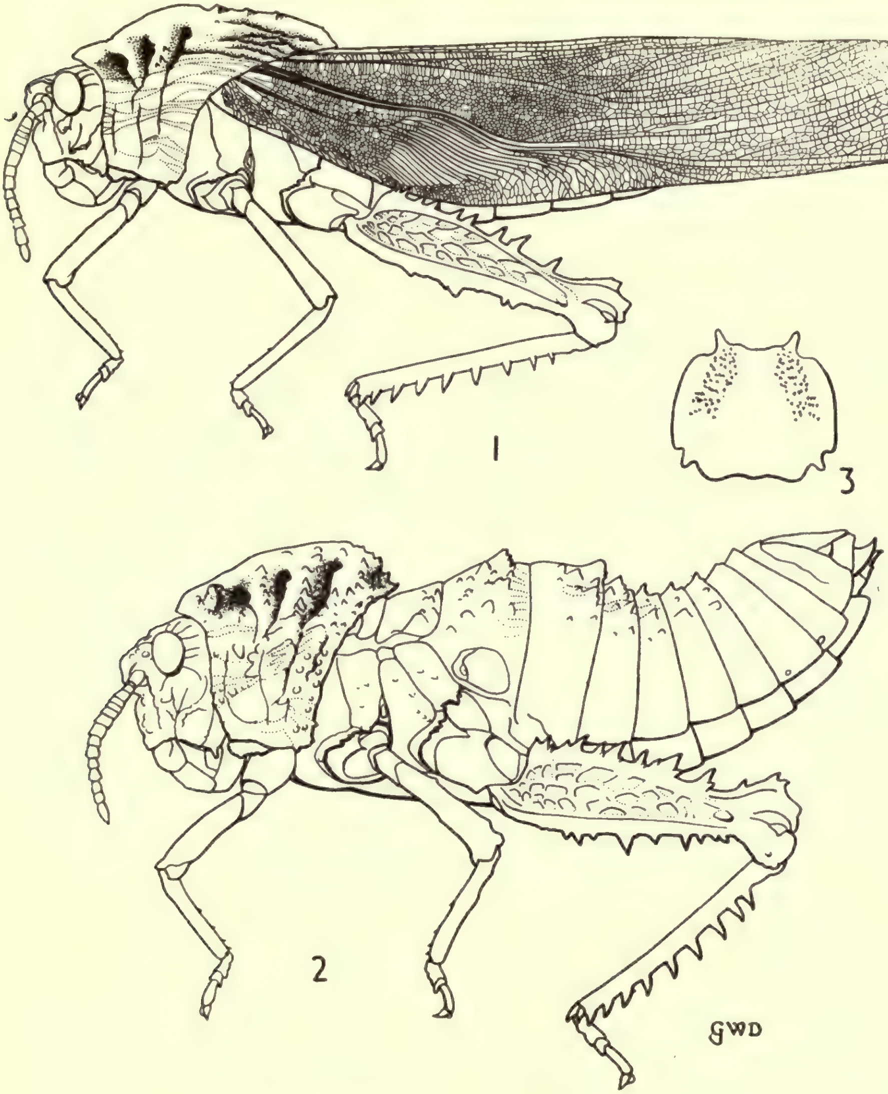

FIG. 10. *Porthetis carinata* (L.). 1. Male. 2. Female. 3. Epiphallus.

The *Porthetinae* were regarded as a group (Dirsh, 1958), but according to all the characters and particularly owing to the peculiar stridulatory mechanism, it deserves to be accorded subfamily rank.

This subfamily is distributed from S. Africa to Angola, E. Africa, the Red Sea area and the SW. corner of Arabia.

List of known genera :

1. *Aphantotropis* Uvarov, 1924
2. *Bolivarella* Saussure, 1887
3. *Cultrinotus* I. Bolivar, 1925
4. *Hoplolopha* Stål, 1876
5. *Lamarckiana* Kirby, 1910
6. *Loboscelianа* Dirsh, 1958
7. *Pagopedilum* Karsch, 1896
8. *Porthetis* Serville, 1831
9. *Puncticornia* Dirsh 1958
10. *Stolliana* I. Bolivar, 1916
11. *Trachypetrella* Kirby, 1910
12. *Transvaaliana* Dirsh, 1958
13. *Vansoniacris* Dirsh, 1958
14. *Xiphoceriana* Dirsh, 1958

Subfamily ***Akicerinae***

(Text-fig. 11)

Type genus : *Akicera* Serville, 1831

Of medium size ; body compressed or depressed. Integument mostly strongly rugose. Antenna from filiform to ensiform. Head from conical to subglobular. Pronotum from high crested to flat, depressed ; metazona mostly longer, sometimes slightly shorter, than prozona. Prosternal process mostly collar-like. Elytra and wings fully developed, shortened, vestigial, or absent. Second vannal vein of hind wing curved and first and third vannal areas expanded (stridulatory specialization). Krauss's organ present, sometimes poorly developed. Tympanum present. Middle tibia on upper side with row of small teeth or tubercles (second part of stridulatory specialization). External apical spine of hind tibia mostly present.

This subfamily represents a combination of several groups or tribes which were known as *Akicerini*, *Adephagini*, part of *Thrinchini* and part of *Batrachotetrigini*. They are all united by a common stridulatory specialization of the venation of the hind wing and specialization of the middle tibia. In this respect they constitute a natural group equal to the others of subfamily rank. However, their appearance is rather diverse and they can be easily subdivided into lower taxonomic units, corresponding to the groups or tribes mentioned above.

Akicerinae occur in S. and N. Africa, SE. Europe and Asia.

List of known genera :

1. *Akicera* Serville, 1831
2. *Adephagus* Saussure, 1887
3. *Asiotmethis* Uvarov, 1943
4. *Atrichotmethis* Uvarov, 1943
5. *Batrachornis* Saussure, 1884
6. *Batrachotetrix* Burmeister, 1838
7. *Eotmethis* Bey-Bienko, 1948
8. *Eremocharis* Saussure, 1884
9. *Eremopeza* Saussure, 1884
10. *Eremotettix* Saussure, 1888
11. *Eremotmethis* Uvarov, 1943
12. *Filchnerella* Karny, 1908
13. *Glyphanus* Fieber, 1853
14. *Glyphotmethis* Bey-Bienko, 1948
15. *Haplotropis* Saussure, 1888
16. *Iranotmethis* Uvarov, 1943
17. *Melanotmethis* Uvarov, 1943
18. *Mongolotmethis* Bey-Bienko, 1948
19. *Pezotmethis* Uvarov, 1943
20. *Prionotropis* Fieber, 1853
21. *Pseudotmethis* Bey-Bienko, 1948
22. *Rhinotmethis* Sjöstedt, 1933
23. *Strumiger* Zubowsky, 1896
24. *Thrinchus* Fischer v. Waldheim, 1833
25. *Tmethis* Fieber, 1853
26. *Tuarega* Uvarov, 1943
27. *Utubius* Uvarov, 1936

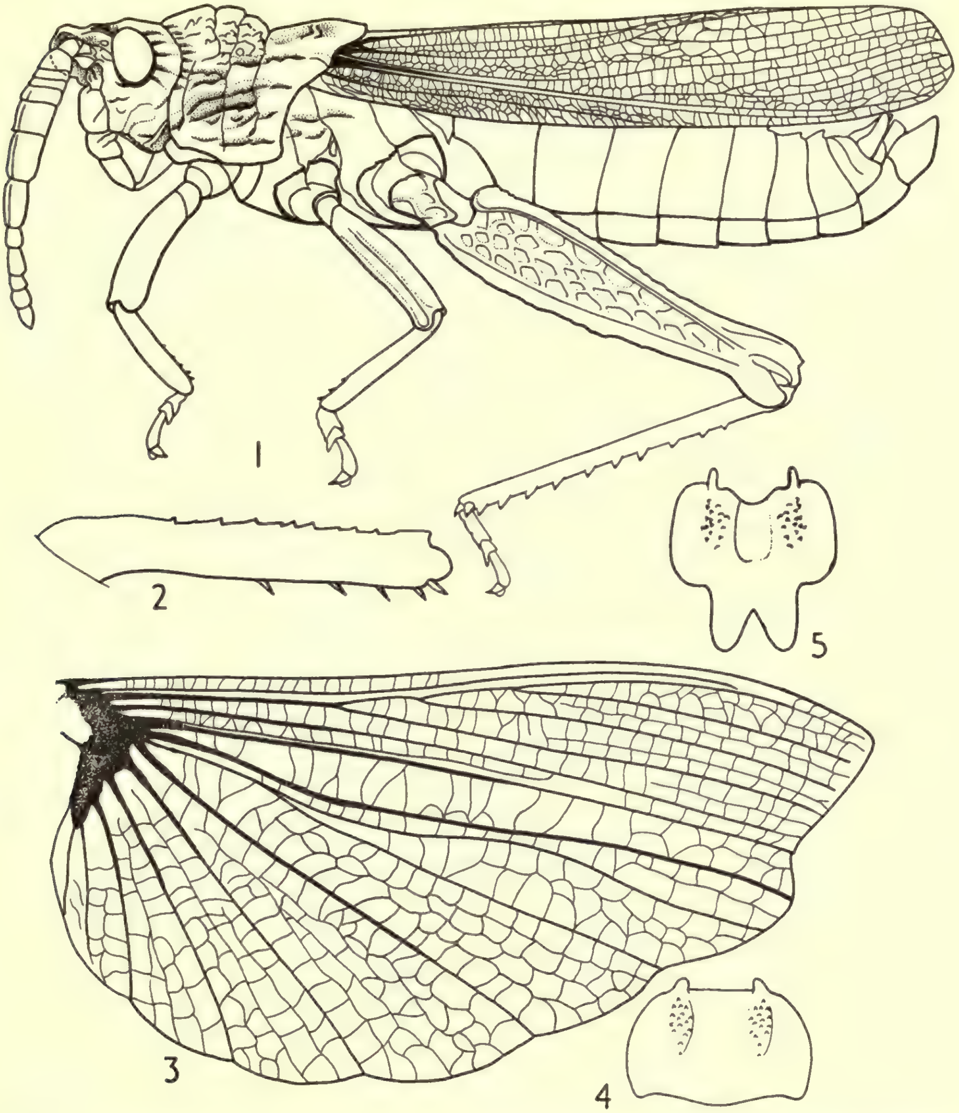

FIG. 11. 1–4. *Akicera fusca* (Thunb.). 1. Male. 2. Middle tibia, with dorsal serration. 3. Wing. 4. Epiphallus. 5. Epiphallus of *Tmethis cisti* (F.)

Subfamily ***Pamphaginae***

(Text-fig. 12)

Type genus : *Pamphagus* Thunberg, 1815

From small to large size ; body compressed to depressed. Integument rugose, sometimes shiny. Antenna filiform, ribbon-like or weakly ensiform. Fastigium of

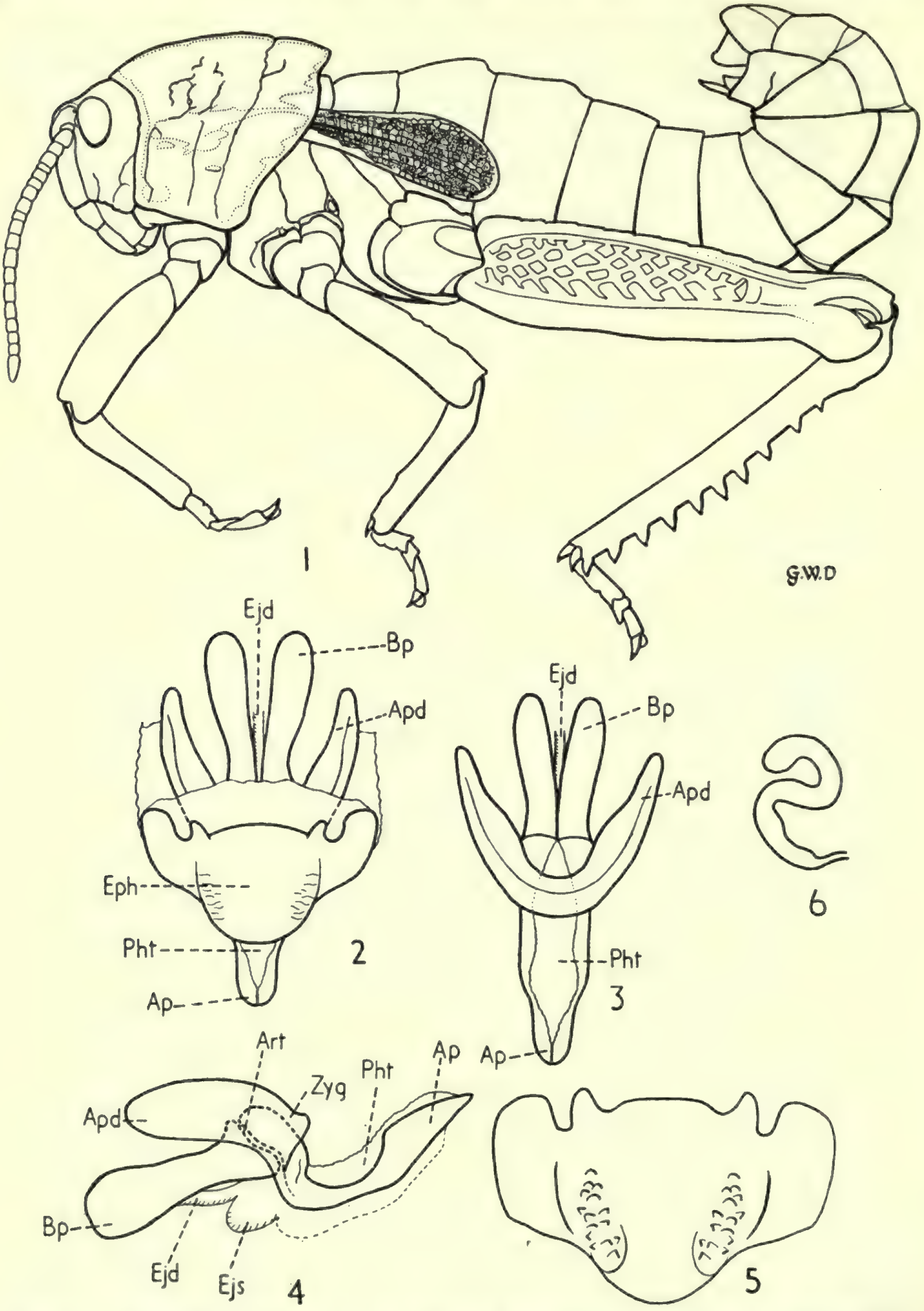
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Fig. 12. *Pamphagus elephas* (L.). 1. Male. 2–5. Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. The same in profile. 5. Epiphallus. 6. Spermatheca.

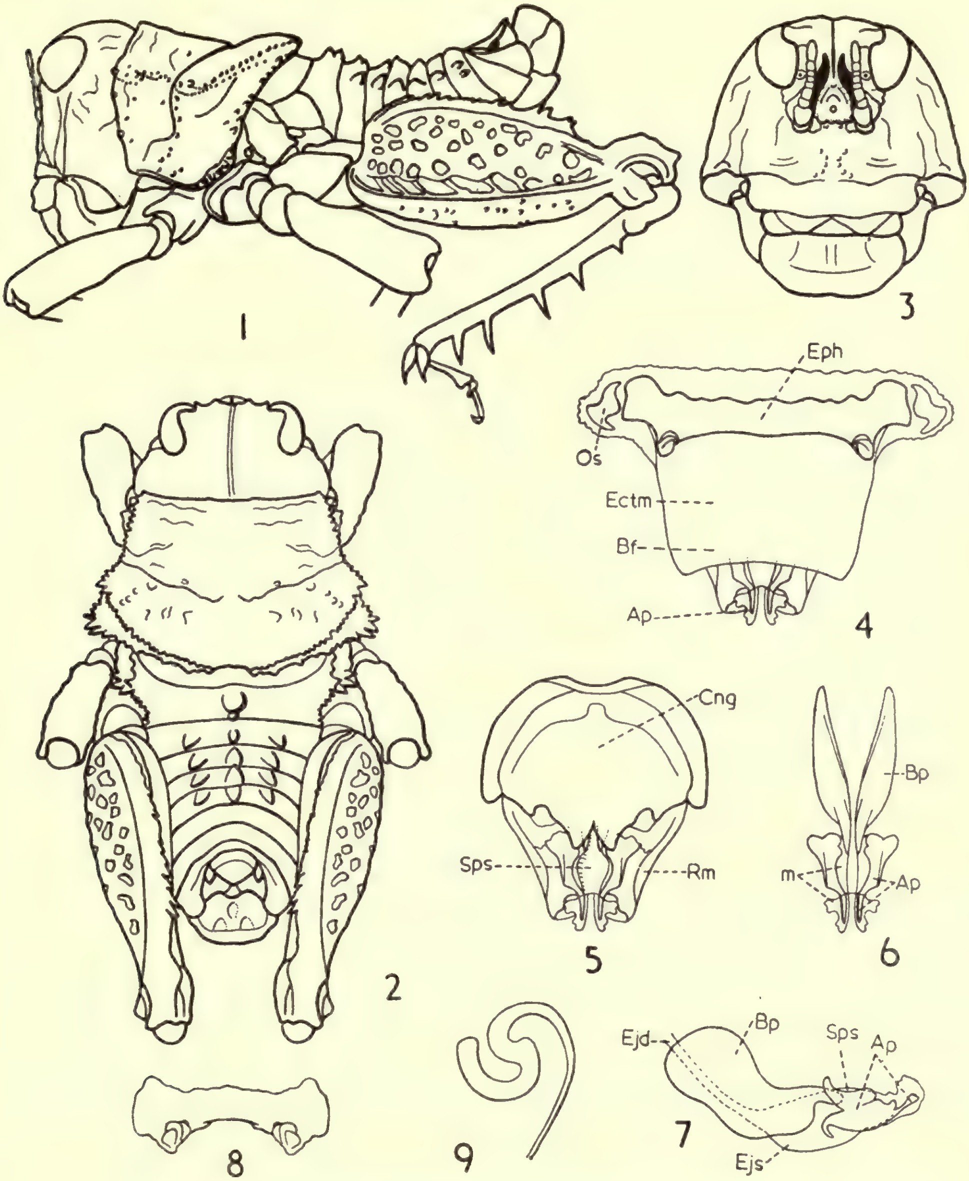
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FIG. 13. 1–3 *Batrachidacris tuberculata* (Rehn). 1. Male, in profile. 2. The same, from above. 3. Face (antennal grooves painted black). 4–7. Phallic complex of *Batrachidacris rubridens* (Uv.). 4. Whole phallic complex from above. 5. The same, but ectophallic membrane and epiphallus removed. 6. Penis, from above. 7. Endophallus, in profile. 8. Epiphallus of *Batrachidacris tuberculata* (Rehn). 9. Spermatheca of *Lathicerus cimex* Sauss.

vertex slightly projecting forwards. Pronotum from crest-like to flat, depressed; metazona always much shorter than prozona. Prosternal process of variable form. Elytra and wings lobiform, lateral, vestigial or absent. Tympanum present or absent. Krauss's organ mostly present. External apical spine of hind tibia present.

Of all the subfamilies of *Pamphagidae* this is probably the most heterogeneous. It contains genera of widely diverse appearance, which are united by the retrogression of characters connected with the loss or great reduction of wings; genera which cannot be placed into other, well defined subfamilies. Nevertheless, the characters (see key and diagnosis) are sufficient to differentiate the *Pamphaginae*, even if it is a rather artificial assemblage.

The subfamily is distributed in N. Africa, S. Europe and W. Asia.

List of known genera :

1. *Acinipe* Rambur, 1838
2. *Acrostira* Enderlein, 1929
3. *Ananothrotes* Mistshenko, 1951
4. *Araxiana* Mistshenko, 1951
5. *Bufonocarodes* Mistshenko, 1951
6. *Eunapiodes* I. Bolivar, 1907
7. *Eunothrotes* Adelung, 1907
8. *Euryparyphes* Fischer, 1853
9. *Finotia* Bonnet, 1884
10. *Glauia* I. Bolivar, 1912
11. *Glauvarovia* Morales, 1949
12. *Iranacris* Mistshenko, 1951
13. *Nocaracris* Uvarov, 1928
14. *Nocarodes* Fischer v. Waldheim, 1846
15. *Ocneridia* I. Bolivar, 1912
16. *Ocnerodes* Brunner, 1882
17. *Ocneropsis* Uvarov, 1942
18. *Oronothrotes* Mistshenko, 1951
19. *Pamphagus* Thunberg, 1815
20. *Paraeumigus* I. Bolivar, 1914
21. *Paranocaracris* Mistshenko, 1951
22. *Paranocarodes* I. Bolivar, 1916
23. *Paranothrotes* Mistshenko, 1951
24. *Pseudamigus* Chopard, 1943
25. *Pseudonothrotes* Mistshenko, 1951
26. *Prionosthenus* I. Bolivar, 1878
27. *Purpuraria* Enderlein, 1929
28. *Savalania* Mistshenko, 1951
29. *Tropidauchen* Saussure, 1887
30. *Znojkiana* Mistshenko, 1951

Family ***Lathiceridae***

(Text-fig. 13)

Type genus : *Lathicerus* Saussure, 1888

Body robust, depressed. Head mostly prognathous. Fastigial furrow present. Antenna short, 7–13 segmented, closely fitted into deep antennal groove on sides of frontal ridge. Ocelli absent. Prosternal process present. Metasternal interspace short and very wide. Elytra, wings and tympanum absent. Lower basal lobe of hind femur longer than upper one. Brunner's organ present. External apical spine of hind tibia absent. Ectophallus differentiated; cingulum shield-like, without apodemes; valves of penis paired, divided; spermatophore sac ventral. Epiphallus bridge-shaped, with lophi and without ancorae. Oval sclerites present. Stridulatory mechanism not known.

The first two genera of the family, *Lathicerus* and *Crypsicerus*, when described by Saussure in 1888, were placed by him in "*Thrincites*" of *Oedipodinae*. In 1943 Uvarov transferred the three then known genera of the group to the tribe *Thrinchini* of *Pamphagidae*. Dirsh, after study of the phallic complex, raised the group to subfamily rank (1954) and later (1956) to family rank.

The reasons for regarding this group as a family are obvious from the diagnosis. Such a striking character as the antennal grooves is not known in other families. The cingulum and penis are also quite unique.

Lathiceridae occur in S. and SW. Africa only.

List of known genera :

1. *Batrachidacris* Uvarov, 1939
2. *Crypsiceracris* Miller, 1932
3. *Crypsicerus* Saussure, 1888
4. *Lathicerus* Saussure, 1888

Family *Pyrgomorphidae*

(Text-fig. 14)

Type genus : *Pyrgomorpha* Serville, 1838

Body of variable shape. Head acutely conical. Fastigial furrow present. Prosternal process present. Elytra and wings fully developed, reduced or absent. Tympanum normally present. Lower basal lobe of hind femur normally longer than upper one. Brunner's organ present except few genera, with thin, almost cursorial hind legs. External apical spine of hind tibia present or absent. Ectophallus differentiated ; cingulum capsule-like ; valves of penis paired, undivided ; spermatophore sac in dorsal position. Epiphallus bridge-shaped, with dorso-lateral appendices ; ancorae absent ; lophi hook-like. Oval sclerites absent. No stridulatory mechanism known.

The name *Phymateidae* was used for this family by Jakobson & Bianki (1904) and earlier as a group name by various authors, but for the last fifty years and more it was known as *Pyrgomorphidae* and this usage should be retained as less likely to cause confusion.

The *Pyrgomorphidae* are a very well defined family, with a peculiar phallic complex which is rather uniform through the family.

The relationship with other families is rather obscure and no close affinities exist. They have some common features with *Lentulidae*, such as the undivided, paired valves of the penis and the dorsal position of the spermatophore sac, and others with *Ommexechidae*, such as the presence of a fastigial furrow and the paired undivided valves of the penis. All other characters, however, are so distinct that the relationship is a very remote one.

Pyrgomorphidae are represented in all the tropical and subtropical parts of the world by a large number of genera, a list of which appears unnecessary.

Family *Ommexechidae*

(Text-fig. 15)

Type genus : *Ommexecha* Serville, 1831

Body of variable shape. Head of variable shape. Fastigial furrow present. Prosternal process present. Elytra and wings fully developed, shortened or absent. Cubital vein of elytron unbranched. Tympanum present or absent. Stridulatory

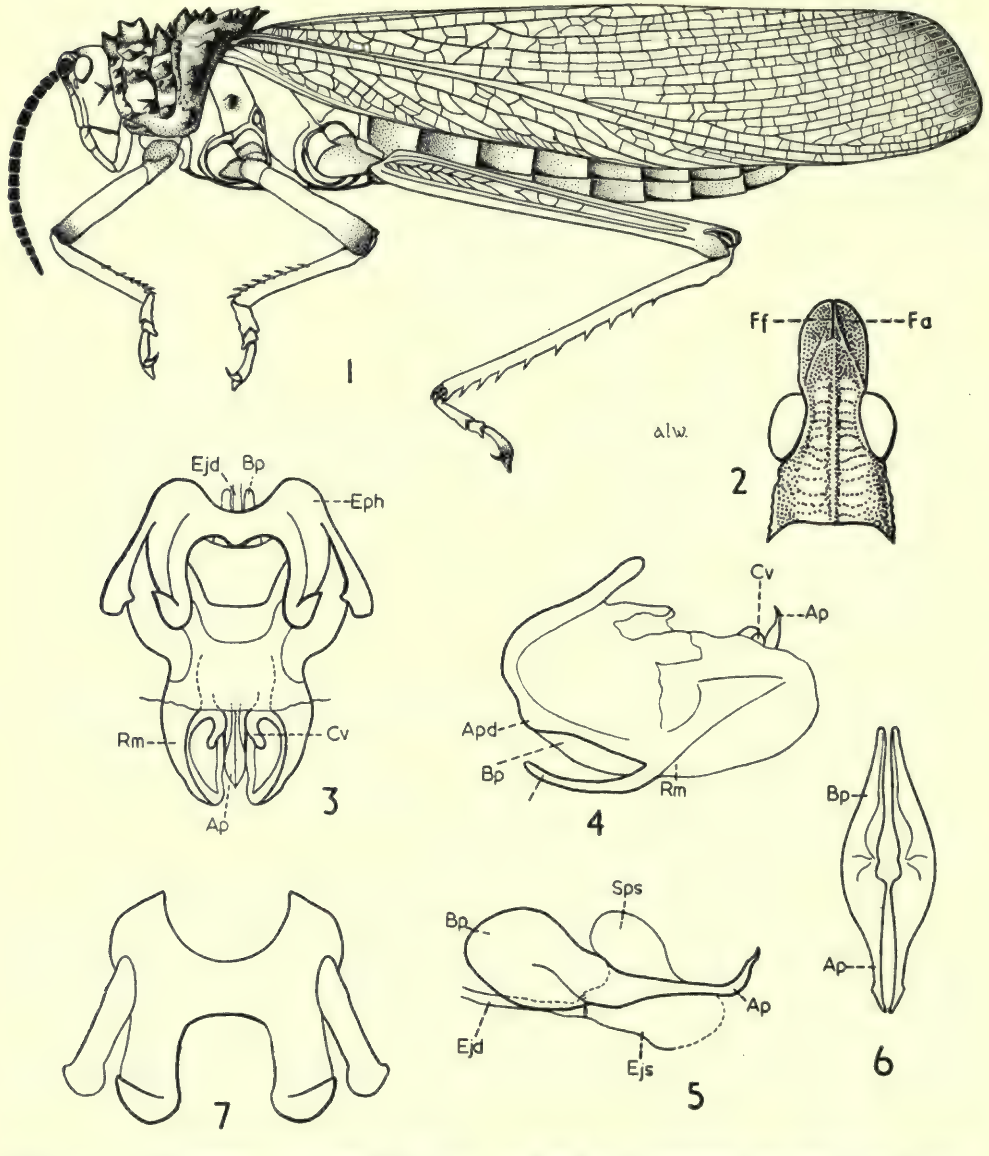
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FIG. 14. 1. *Phymateus viridipes* St., male. 2. Head of *Pyrgomorphella arachidis* Dirsh (Ff. fastigial furrow. Fa. fastigial area). 3–6. Phallic complex of *Phymateus morbillosus* (L.). 3. Whole phallic complex from above. 4. The same, in profile. 5. Endophallus, in profile. 6. Penis, from above. 7. Epiphallus of *Phymateus purpurascens* Karsch.

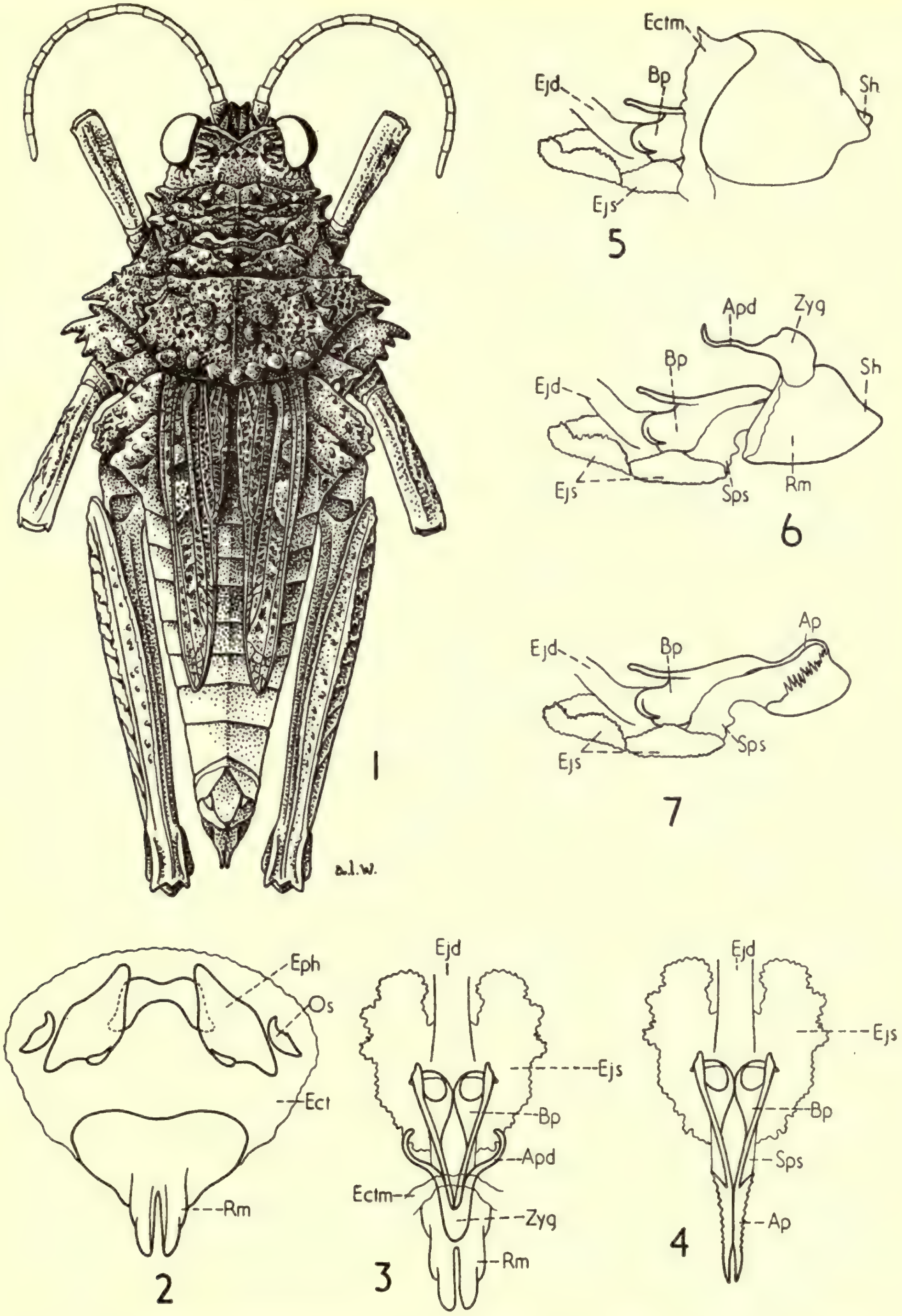
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FIG. 15. 1–7. *Ommexecha servillei* Blanch. 1. Female. 2–7 Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. Endophallus from above. 5. In profile. 6. The same, with ectophallic membrane removed. 7. Endophallus in profile.

mechanism (elytron-femur) sometimes present, but very imperfect. Lower basal lobe of hind femur as long as, or slightly longer than, upper one. Brunner's organ present. External apical spine of hind tibia absent. Ectophallus differentiated; cingulum differentiated, forming apodemes; valves of penis paired, not divided; ejaculatory sac with additional pockets. Epiphallus bridge-shaped, with lateral plates joined by membrane; ancorae absent; lophi present. Oval sclerites present.

This family is very insufficiently studied. Very remote affinity with the *Pyrgomorphidae* is suggested by the presence of the fastigial furrow and by the undivided valves of the penis; the latter, which were described (Dirsh, 1956) as flexured owing to the presence of a very long and thick flexure, may be better regarded as not divided, but rather as having a very elongate and rather thin medial part. The peculiar joining of the lateral plates of the epiphallus by membrane is found elsewhere only in *Pauliniidae*.

The *Ommexechidae* occur in S. America only.

List of known genera :

1. *Graea* Philippi, 1863
2. *Ommexecha* Serville, 1831
3. *Pachyossa* Rehn, 1913
4. *Parossa* Bruner, 1911
5. *Spathalium* I. Bolivar, 1884

Family ***Pauliniidae***

(Text-fig. 16)

Type genus : *Paulinia* Blanchard, 1843

Body subcylindrical. Head subconical. Fastigial furrow absent. Ocelli very large. Prosternal process absent. Elytra and wings fully developed or shortened. Medial and cubital veins of elytron unbranched. Tympanum present. Lower basal lobe of hind femur shorter than upper one. Brunner's organ present. Hind tibia strongly expanded; external apical spine present; basal tarsal segment expanded. Ectophallus differentiated; cingulum differentiated; valves of penis paired, divided; ejaculatory sac with lateral pockets. Epiphallus bridge-shaped, with ancorae and lophi; lateral plates connected with bridge by membrane. Oval sclerites present. Ovipositor strongly reduced, shorter or hardly exceeding subgenital plate. Stridulatory mechanism not found.

The family *Pauliniidae* is insufficiently studied and its position is rather doubtful. The structure of the epiphallus and ejaculatory sac approximate it to *Ommexechidae*, but the lobes of the hind femur, the lower lobe being shorter than the upper, and the absence of the fastigial furrow and of the prosternal process, suggest some affinity with *Acrididae*. However, the whole phallic complex, with its complicated structure, the divided valves of the penis, the complicated ejaculatory sac, and the peculiar epiphallus, isolate it from *Acrididae*. According to the size of chromosomes (Helwig, 1958), the *Pauliniidae* cannot be placed in *Acrididae*.

The family at present contains two genera: *Paulinia* Blanchard, 1843, and *Marellia* Uvarov, 1929, but the latter genus probably does not belong here. Its affinity needs further study.

The family occurs in S. America only.

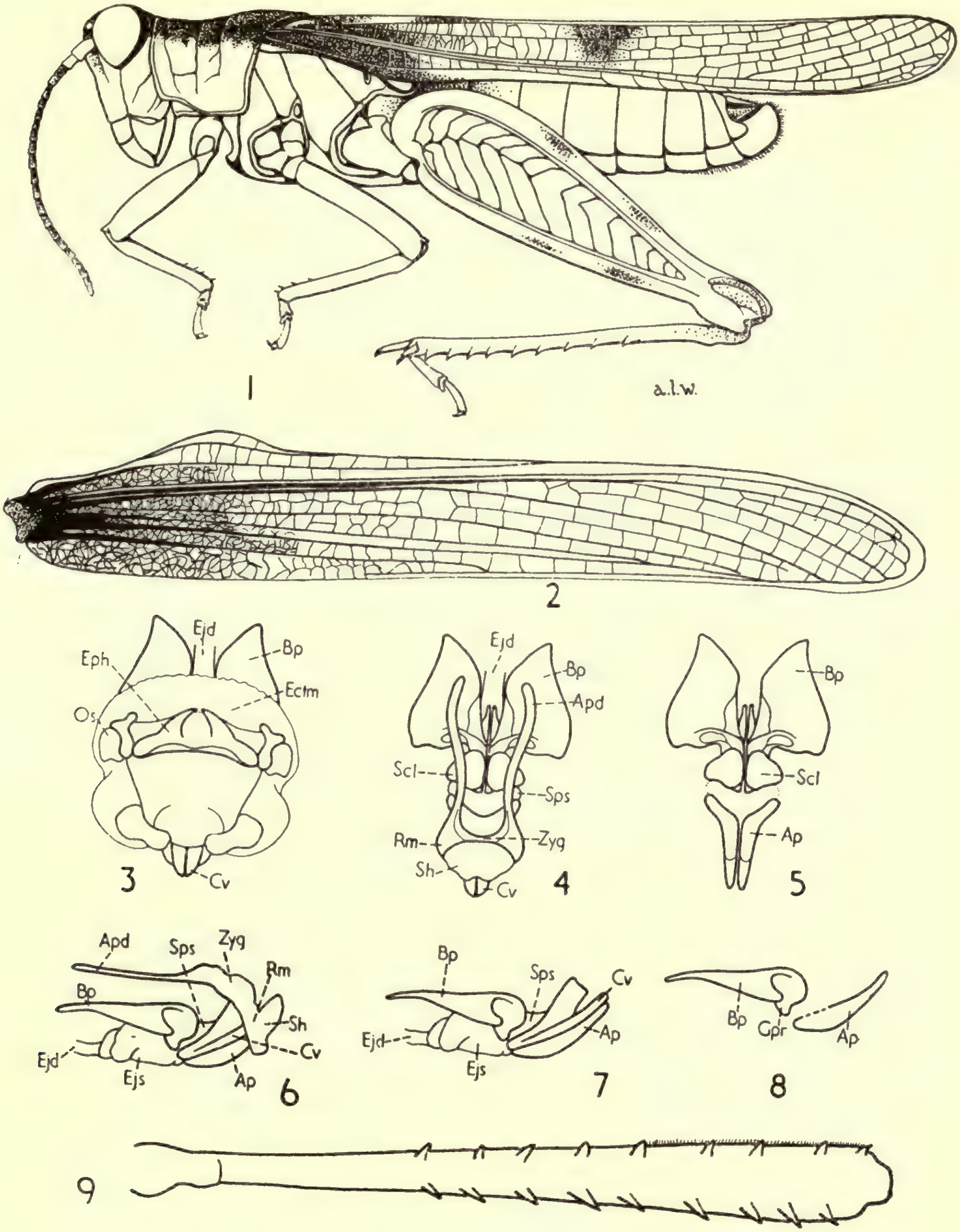
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FIG. 16. 1–8. *Paulinia acuminata* (DeGeer). 1. Male. 2. Right elytron. 3–8. Phallic complex. 3. Whole phallic complex from above. 4. The same, but ectophallic membrane and epiphallus removed. 5. Endophallus, from above. 6. As 4, but in profile. 7. Endophallus, in profile. 8. Penis, in profile. 9. Left hind tibia from above.

Family ***Lentulidae***

(Text-fig. 17)

Type genus : *Lentula* Stål, 1878

Body of variable shape. Head of variable shape. Fastigial furrow absent. Pronotum short. Prosternal process present. Elytra, wings and tympanum absent. Lower basal lobe of hind femur shorter than upper one. Brunner's organ present. External apical spine of hind tibia present or absent. Ectophallus differentiated ; cingulum differentiated ; valves of penis paired, undivided ; spermatophore sac dorsal. Epiphallus bridge-shaped, with ancorae and lophi. Oval sclerites present. Stridulatory mechanisms not found.

This recently erected family (Dirsh, 1956) consists of genera with highly retrogressive external characters. They have lost wings and tympanum, and the pro-, meso- and metathorax are reduced. As a result they have a nymphal appearance and are externally similar to the wingless and tympanum-less representatives of other families. The phallic complex, however, provides an excellent character. Its structure is only remotely similar to that of *Pyrgomorphidae* (Dirsh, 1956) and quite different from that in all other families. It is not possible to relate this family closely to any known family. The most difficult problem presented by the *Lentulidae* is that there are no reliable external characters, and for identification of its representatives it is necessary to investigate the phallic complex. The only external character which is consistent in this family is the complete absence of wings and tympanum, while in the other families this state occurs only as a retrogression. Moreover, in the only species of the family studied with regard to the anatomy, the indirect flight muscles are completely absent in the adult, while they are present in other wingless acridoids (Ewer, 1958).

Lentulidae are distributed in South Africa and part of East Africa.

List of known genera :

1. *Bacteracris* Dirsh, 1956
2. *Basutacris* Dirsh, 1953
3. *Betiscoides* Sjöstedt, 1923
4. *Devylderia* Sjöstedt, 1923
5. *Eremidium* Karsch, 1896
6. *Gymnidium* Karsch, 1896
7. *Helwigacris* Rehn, 1944
8. *Karruacris* Dirsh, 1958
9. *Karruia* Rehn, 1945
10. *Lentula* Stål, 1878
11. *Mecostiboides* Dirsh, 1957
12. *Mecostibus* Karsch, 1896
13. *Nyassacris* Ramme, 1929
14. *Paralentula* Rehn, 1944
15. *Qachasia* Dirsh, 1956
16. *Shelfordites* Karny, 1910
17. *Swaziacris* Dirsh, 1953
18. *Sygrus* I. Bolivar, 1889
19. *Usambilla* Sjöstedt, 1909

Family ***Acrididae***

Type genus : *Acrida* Linnaeus, 1758

Body and head of extremely variable shape. Fastigial furrow absent (rarely present, but apparently as a secondary formation). Prosternal process present or absent. Elytra and wings fully developed or reduced, or absent. Tympanum normally present. Stridulatory mechanisms of various structure found in the majority of subfamilies. Lower basal lobe of hind femur mostly shorter than or equal to upper one. Brunner's organ present. External apical spine of hind tibia present or absent. Ectophallus differentiated; cingulum differentiated; valves of penis paired, flexured or divided. Epiphallus mostly bridge-shaped, sometimes disc-shaped, sometimes divided; ancorae and lophi present (sometimes lost). Oval sclerites present.

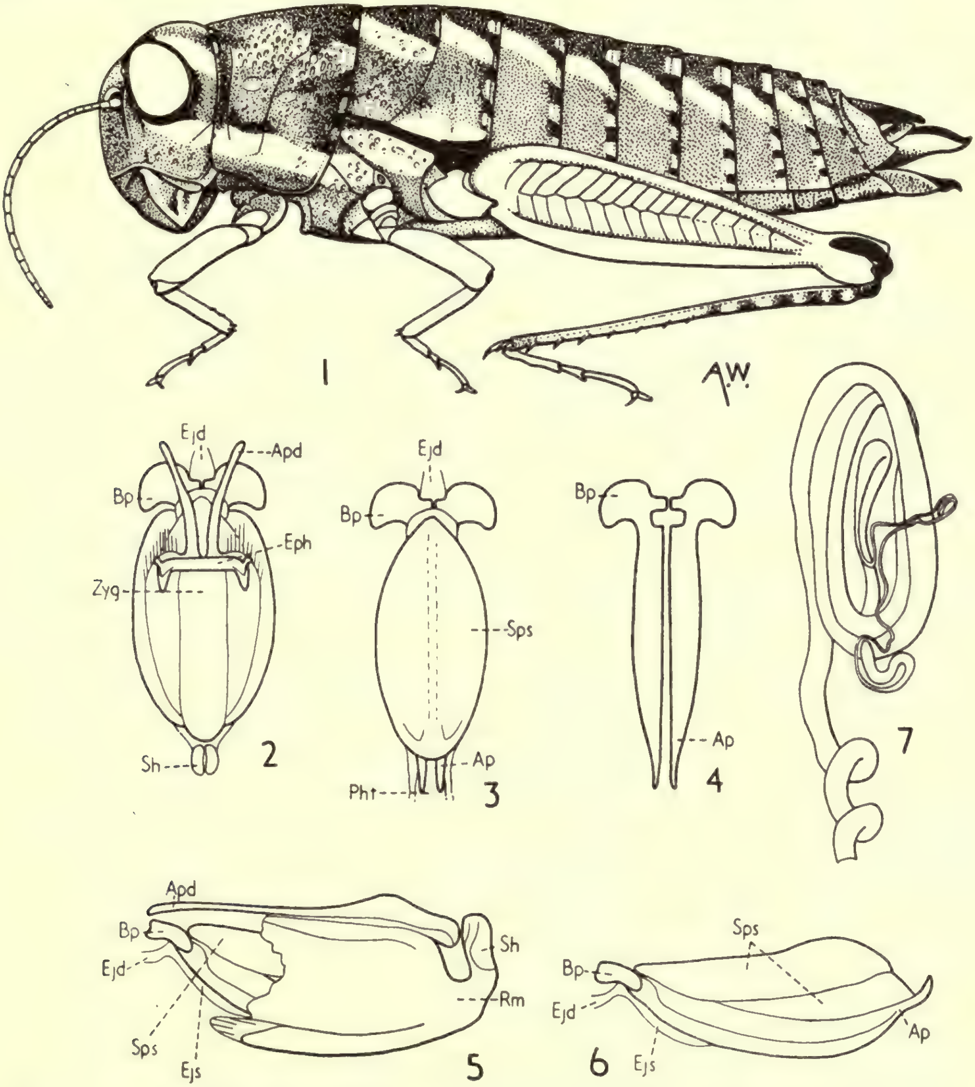
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FIG. 17. 1–7. *Lentula callani* Dirsh. 1. Male. 2–6. *L. obtusifrons* St. phallic complex. 2. From above. 3. From below. 4. Penis from above. 5. Whole phallic complex, in profile. 6. Endophallus, in profile. 7. Spermatheca.

The family *Acrididae* is the most numerous, most heterogeneous and probably most recent and advanced family. It is divided below into seventeen subfamilies of unequal value and probably of different phylogenetic status. It is possible that further study, particularly of the so-called aberrant genera, would demand a revision, and the present arrangement of the subfamilies should be regarded as tentative and practical rather than natural.

As a family the *Acrididae* show remote affinity with *Pauliniidae* but no close relationship with the other families.

TABLE III.—*Subfamilies of* Acrididae *and their Main Characters*

Subfamily	Valves of penis	Epiphallus	Comstock-Kellogg glands*	Basal lobes of hind femur	Stridulatory mechanism	Tympanum
Dericorythinae	Paired flexured	Bridge-shaped	—	Equal length	— or +	Normally present
Chilacridinae	Ditto	Ditto	?	Ditto	—	Ditto
Romaleinae	,,	,,	+ or —	,,	+	,,
Lithidiinae	Paired divided	,,	?	Lower lobe shorter	—	Absent
Hemiacridinae	Ditto	,,	+	Ditto	+ or —	Normally present
Tropidopolinae	Paired flexured	,,	+	,,	— or +	Ditto
Oxyinae	Ditto	Divided or with tendency to be divided	+	,,	—	,,
Coptacridinae	,,	Divided	+	,,	—	,,
Calliptaminae	,,	Plate-like	+	,,	—	,,
Euryphyminae	,,	Divided	+	,,	—	,,
Eyprepocnemidinae	,,	Bridge-shaped	+	,,	—	,,
Catantopinae	,,	Bridge-shaped sometimes divided	+ or —	,,	—	,,
Cyrtacanthacridinae	,,	Bridge-shaped	+	,,	—	,,
Egnatiinae	,,	Ditto	+	,,	+ or —	,,
Acridinae	,,	,,	—	,,	+ or —	,,
Eremogryllinae	,,	Divided	?	,,	+	,,
Truxalinae	,,	Bridge-shaped	—	,,	+	,,

* According to Slifer (1939–43).

Key to Subfamilies of *Acrididae*

1 (6) Lower basal lobe of hind femur as long as upper one or only insignificantly longer or shorter.

2 (5) First vannal area of hind wing (if present) without stridulatory specialization.

3 (4) Hind tibia curved. Median carina of pronotum raised in prozona. Cingulum of ectophallus with long apodemes. (Asia, Africa) . . . *Dericorythinae*

4 (3) Hind tibia not curved. Median carina of pronotum not raised. Cingulum of ectophallus with short, plate-like apodemes. (S. America) . *Chilacridinae*

5 (2) First vannal area of hind wing with series of parallel, transverse, finely serrated stridulatory veinlets ; medial, cubital and second vannal areas expanded, with row of parallel thickened, transverse veinlets. Hind tibia not curved. Median carina of pronotum of variable shape or absent . . *Romaleinae*

6 (1) Lower basal lobe of hind femur distinctly shorter than upper one.

7 (8) Body depressed. Tympanum absent even in fully winged species. Mesosternal interspace very large and wide, often separated from metasternal only by suture . . . . *Lithidiinae*

8 (7) Body not depressed or if depressed, then tympanum present. Sometimes tympanum absent, but then body compressed or cylindrical. Mesosternal interspace variable, but well distant from metasternal.

9 (10) Radial area of elytron with a series of regular, parallel stridulatory veinlets (Text-fig. 22). If apterous, then body compressed and tympanum absent *Hemiacridinae*

10 (9) Stridulatory veinlets of radial area of elytron absent. If apterous, then typanum (at least rudimentary) present.

11 (26) Prosternal process, or collar present.

12 (13) Lower external lobe of hind knee with spine-like apex (Text-fig. 24) . *Oxyinae*

13 (12) Lower external lobe of hind knee with apex rounded, angular or subacute, but not spine-like.

14 (15) Last abdominal tergite in male (in majority of genera) with well developed furcula ; supra-anal plate mostly with attenuate or trilobate apex ; subgenital plate with transverse fold . . . . *Coptacridinae*

15 (14) Last abdominal tergite in male without well developed furcula ; supra-anal plate variable ; subgenital plate without transverse fold.

16 (17) Mesosternal interspace closed . . . . *Tropidopolinae*

17 (16) Mesosternal interspace open.

18 (25) Mesosternal lobes rounded or obtusangular.

19 (20) Male cerci pincers-like, strong, regularly incurved. Epiphallus discoidal, without lophi . . . . *Calliptaminae*

20 (19) Male cerci variable, but not pincers-like. Epiphallus variable, but always with lophi.

21 (22) Male cercus with large basal articulation ; posterior margin of the last abdominal tergite strongly sclerotized. Epiphallus divided, with large, mostly angular, lophi . . . . *Euryphyminae*

22 (21) Basal articulation of male cerci small. Posterior margin of the last abdominal tergite not strongly sclerotized. Epiphallus not divided, or if divided, then with comparatively small, lobiform lophi.

23 (24) Dorsum of pronotum flat or weakly tectiform, with median and lateral carinae linear (lateral carinae sometimes obliterated). Male cercus with strongly compressed lobiform or subacute apex . . . . . *Eyprepocnemidinae*

24 (23) Dorsum of pronotum of variable shape ; lateral carinae, if present, not linear. Male cercus variable, but not with strongly compressed lobiform or subacute apex . . . . *Catantopinae*

25 (18) Mesosternal lobes rectangular . . . . *Cyrtacanthacridinae*

26 (11) Prosternal process or collar usually absent ; if present, then antenna ensiform and body strongly elongated.

27 (30) Stridulatory serration on internal side of hind femur absent.

28 (29) Furcal suture of mesosternum curved backwards in the middle, thus shortening the mesosternal interspace (Text-fig. 31). Sides of abdominal tergites often with transverse (stridulatory) ridges . . . . *Egnatiinae*

29 (28) Furcal suture of mesosternum of normal shape. No stridulatory specialization on sides of abdominal tegites . . . . *Acridinae*

30 (27) Stridulatory serration on internal side of hind femur present.

31 (32) Male cercus strongly thickened in basal part with strongly incurved apex *Eremogryllinae*

32 (31) Male cercus simple, mostly conical . . . . *Truxalinae*

Subfamily ***Dericorythinae***

(Text-fig. 18)

Type genus : *Dericorys* Serville, 1838

Size large, medium or small. Head variable. Pronotum with strong crest or at least hump in prozona only. Prosternal process or collar present. Mesosternal interspace open. Elytra and wings fully developed, shortened, lobiform or absent. Tympanum present or (in apterous species) absent. Lower basal lobe of hind femur as long as, or slightly longer than, upper one. Hind tibia curved ; external apical spine present. Basal and apical valves of penis connected by flexure. Epiphallus bridge-shaped, with ancorae and lophi. Stridulatory mechanism not found, except in one species, in which it is represented by inflated part of subcostal area of hind wing.

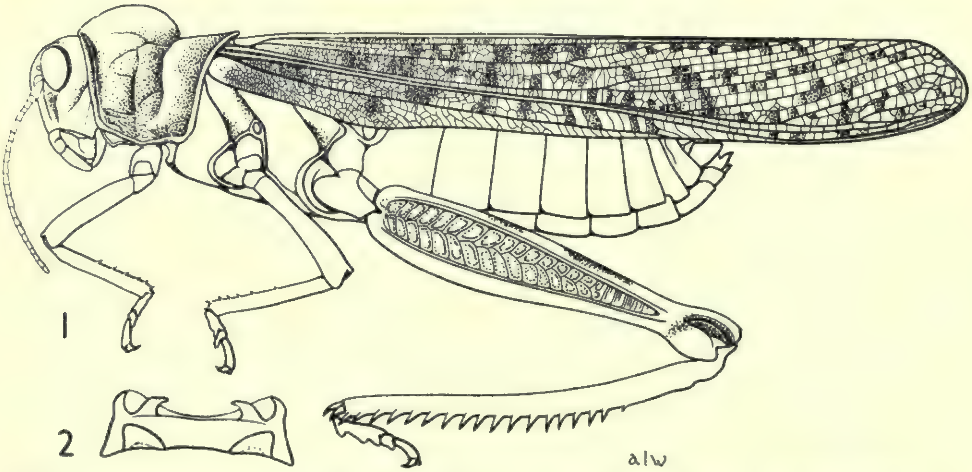

FIG. 18. 1. *Dericorys albidula* Serv., female. 2. Epiphallus of *Dericorys tibialis* (Pall.).

This subfamily was erected by Jakobson (Jakobson & Bianki, 1904), but was disregarded by the later authors, who placed the subfamily into *Catantopinae*.

Dericorythinae are remarkable in that the shape of the lower basal lobe of the hind femur is of the same length as or slightly longer than the upper one, a condition found also as a normal feature in *Romaleinae* and *Chilacridinae* only amongst other subfamilies of *Acrididae*. It is not possible to retain *Dericorythinae* in *Catantopinae* because of the shape of the basal lobes of the hind femur, nor is it possible to regard them as a family, since all the families with this type of femur are characterized by other features, such as the phallic complex, fastigial furrow, and stridulatory mechanism.

Dericorythinae are distributed in SW. and central Asia and Northern Africa.

List of examined genera :

1. *Anamesacris* Uvarov, 1934
2. *Bolivaremia* Morales-Agacino, 1949
3. *Corystoderes* I. Bolivar, 1936
4. *Dericorys* Serville, 1838
5. *Pamphagulus* Uvarov, 1929

Subfamily *Chilacridinae*

(Text-fig. 19)

Type genus : *Chilacris* Liebermann, 1943

Of medium size, integument rugose. Antenna filiform. Head subglobular; fastigium of vertex mostly with faint trace of fastigial furrow. Three sulci crossing dorsum of pronotum. Prosternal process present. Meso- and metasternal interspace short and wide. Elytra and wings fully developed, reduced or absent. Tympanum normally present. Lower basal lobe of hind femur as long as or slightly longer than upper one. External apical spine of hind tibia absent or present. Ectophallus membraneous ; cingulum poorly sclerotized, plate-like, with apodemes wide, short, plate-like, poorly differentiated ; sheath of penis wide, covering whole apical valves of penis. Endophallus strongly sclerotized ; basal valves of penis form long posterior projections, distal ends of which meet distal ends of apical valves of penis, proximal part of them plate-like, widened ; proximal ends of apical valves of penis close to lower part of basal valves ; they are connected by short flexure. Spermatophore sac placed in space between posterior projections of basal valves and apical valves of penis ; ejaculatory sac partly below, partly between proximal parts of basal valves of penis. Epiphallus bridge-shaped, with strong, non-articulated ancorae and strong, hook-shaped lophi. Oval sclerites present. Spermatheca variable, with widened single distal end or forming apical and preapical diverticula.

This subfamily was erected by Liebermann and called *Chilacrinae* in 1942, but the name has to be amended to *Chilacridinae*. He included in it four genera : *Aucacris* Hebard, 1929, *Chilacris* Liebermann, 1943, *Philippiacris* Liebermann, 1943, and *Elasmoderus* Saussure, 1888. Later the genus *Uretacris* Liebermann, 1943, was included in the subfamily and *Elasmoderus* was excluded (Liebermann, 1959, in litt.). *Bufonacris* Walker, 1871, should also be included here.

Dr. J. Liebermann kindly sent me the types of his genera and I was able to study the phallic complex and spermatheca. The phallic complex proved to be of peculiar structure, which was not found in other families and subfamilies of *Acridoidea*. The most striking features are: firstly, the poorly developed cingulum, which resembles that in the primitive families *Tanaoceridae*, *Xyronotidae* and *Pneumoridae*; secondly, the peculiar shape of the endophallus, with the basal valves of the penis forming long posterior projections, which extend to the point of meeting of the apices of the apical valves of the penis, with the spermatophore sac located between them. These general features of the phallic complex are similar in all studied genera of the subfamily, though they vary in details. The phallic complex of

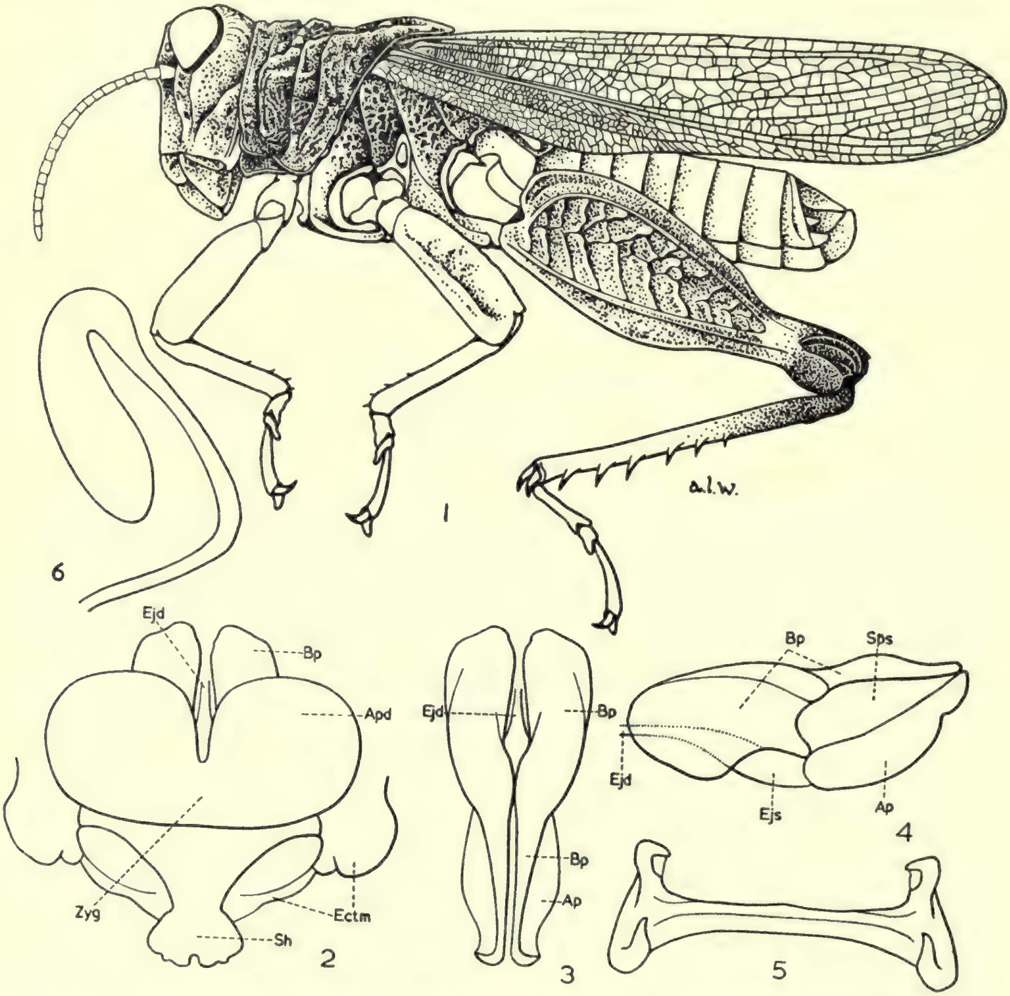

FIG. 19. *Chilacris maculipennis* Lieb., male type. 2–5. *Philippiacris rubiosus* Lieb. 2. Ectophallus, from above (whole proximal part of ectophallic membrane and epiphallus removed). 3. Endophallus, from above. 4. Endophallus, lateral view. 5. Epiphallus. 6. *Chilacris maculipennis*, spermatheca.

Philippiacris is figured (Text-fig. 19), since the several specimens of this genus were in the best condition for dissecting and drawing.

It is difficult to suggest the position and relationship of *Chilacridinae* with other groups of *Acridoidea*. Their genitalia are quite peculiar without a close parallel in the rest of *Acridoidea*. The shape of the basal lobes of the hind femur suggest a possible link with *Romaleinae* and *Dericorythinae*. Tentatively, *Chilacridinae* are placed in the family *Acrididae*, but further detailed studies of South American *Acridoidea* are needed to establish their exact position.

List of known genera :

1. *Aucacris* Hebard, 1929
2. *Bufonacris* Walker, 1871
3. *Chilacris* Liebermann, 1943
4. *Philippiacris* Liebermann, 1943
5. *Uretacris* Liebermann, 1943

Subfamily ***Romaleinae***

(Text-fig. 20)

Type genus : *Romalea* Serville, 1831

Size mostly large or medium. Body of variable shape. Head of variable shape. Prosternal process present. Mesosternal interspace open. Highly specialized stridulatory mechanism present : first vannal area of hind wing narrow, convex, forming tube-like fold, when the wing is folded ; this area has arched, parallel, finely, but strongly serrated, transverse veinlets—sometimes adjoining longitudinal veins are serrated as well ; cubital, second vannal and sometimes medial area are expanded, with thickened, regular, transverse veinlets. Lower basal lobe of hind femur about as long as upper one. External apical spine of hind tibia present or absent. Basal and apical valves of penis connected by strong, thickened flexure. Epiphallus robust, bridge-shaped, with short ancorae and lophi.

The subfamily *Romaleinae* was established by Roberts (1941) on the basis of the phallic complex, but although this character alone is not sufficient for separating the subfamily, several other characters support its status, in particular the peculiar stridulatory mechanism which occurs only in this subfamily and may be traced even in the strongly reduced wings of micropterous species. Sometimes it may be reduced as in *Aplatacris* or strongly reduced as in *Munatia*, in which only weak traces of the serration may be observed. Another character, which occurs elsewhere in *Acrididae*, as a stable normal character, only in *Dericorythinae* and *Chilacridinae* is the lower basal lobe of the hind femur being as long as the upper one. Yet another character is the flexure of the valves of the penis being more robust than is usual in other *Acrididae*.

Members of the *Romaleinae* present the same extreme diversity in the shape of the body and in general appearance as the other large subfamilies. There are amongst them some forms strikingly similar to certain representatives of the *Pamphagidae* (*Phrynotettix*, *Dracotettix*), and of the *Acridinae* (such as *Legua*, which superficially resembles *Acrida ; Callonotacris*, which superficially resembles *Pyrgodera*) ; and *Tropidacris* and allied genera which are very similar to *Cyrtacanthacridinae*.

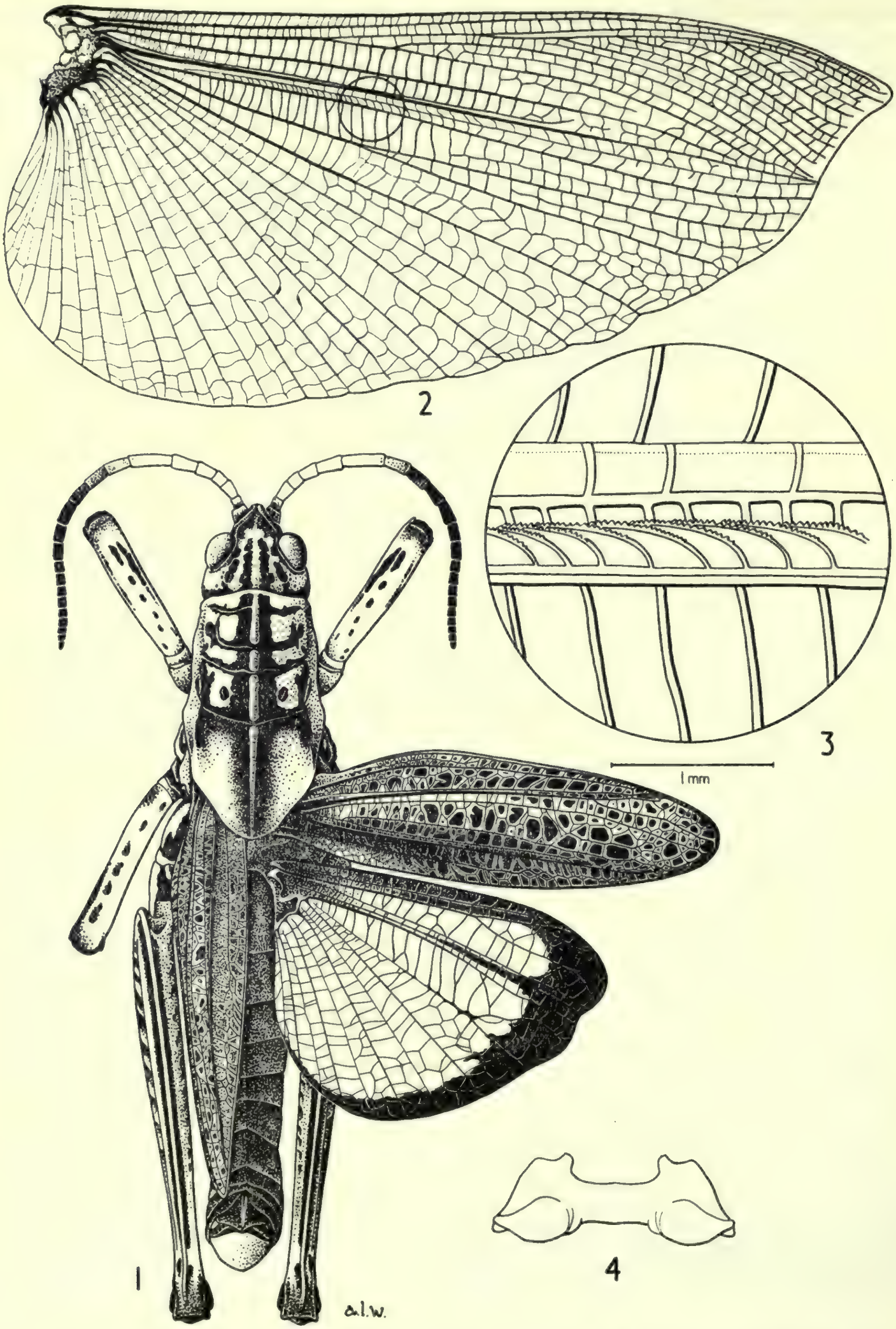

FIG. 20. 1. *Romalea microptera* (Beauv.), male. 2. Wing of *Colpolopha obsoleta* Serv. 3. Part of the stridulatory mechanism under large magnification. 4. Epiphallus of *Romalea microptera*.

Romaleinae occur mainly in S. America with a few in N. America, but several genera are known from NE. Africa and S. Asia.

List of examined genera :

1. *Acrostegastes* Karsch, 1896
2. *Aeolacris* Scudder, 1875
3. *Agriacris* Walker, 1870
4. *Alcamenes* Stål, 1878
5. *Alophonota* Stål, 1873
6. *Antandrus* Stål, 1878
7. *Aplatacris* Scudder, 1875
8. *Brachystola* Scudder, 1876
9. *Callonotacris* Rehn, 1909
10. *Chariacris* Walker, 1870
11. *Chromacris* Walker, 1870
12. *Cibotopteryx* Rehn, 1905
13. *Colpolopha* Stål, 1873
14. *Coryacris* Rehn, 1909
15. *Draconata* Pictet & Saussure, 1887
16. *Dracotettix* Bruner, 1889
17. *Eurynotacris* Ramme, 1931
18. *Eutropidacris* Hebard, 1923
19. *Kabulia* Ramme, 1928
20. *Legua* Walker, 1870
21. *Lophacris* Scudder, 1869
22. *Lyrotyloides* Bey-Bienko, 1956
23. *Lyrotylus* Uvarov, 1923
24. *Munatia* Stål, 1875
25. *Pelecinotus* I. Bolivar, 1881
26. *Phrynotettix* Glover, 1872
27. *Prionacris* Stål, 1878
28. *Prionolopha* Stål, 1873
29. *Procolpia* Stål, 1873
30. *Robecchia* Schulthess, 1898
31. *Romalea* Serville, 1831
32. *Taeniopoda* Stål, 1873
33. *Teratodes* Brulle, 1835
34. *Titanacris* Scudder, 1869
35. *Tropidacris* Scudder, 1869
36. ? *Tropidostethus* Philippi, 1863
37. *Tytthotyle* Scudder, 1897
38. *Xestotrachelus* Bruner, 1913
39. *Xyleus* Gistl, 1848
40. *Zoniopoda* Stål, 1873

Subfamily *Lithidiinae* nov.

(Text-fig. 21)

Type genus : *Lithidium* Uvarov, 1925

Small or medium size, robust, body depressed. Male much smaller than female. Antenna filiform or slightly thickened in apical part. Head subglobular. Fastigium of vertex short, wide. Pronotum short, wide, depressed. Prosternal collar present or absent. Mesosternal interspace very large, close or fused with the metasternal or separated from it only by suture. Elytra and wings present or absent. Tympanum absent. Lower lobe of hind femur shorter than upper one. External apical spine of hind tibia present or absent. Valves of penis paired, divided ; apical ones being thin and reduced. Epiphallus bridge-shaped, with short ancorae and short, hook-shaped lophi. Stridulatory mechanism not found.

Only four genera of this family are known. The first one, *Eneremius* was placed by Saussure in the " Strips *Eremobia* ", then of the subfamily *Oedipodinae*. Uvarov (1925) removed it, with *Lithidium*, to the tribe *Thrinchini*, then of *Oedipodinae*, but in 1943 he transferred the tribe to *Pamphagidae*. Dirsh (1956) referred these two genera and *Lithidiopsis* tentatively to the family *Lentulidae*. The only winged genus, *Microtmethis*, was described by Karny as a member of the *Oedipodinae*. The males of *Lithidium* and of *Microtmethis* have only recently become available. In the phallic complex they proved to be very similar to one another, but strongly different from the *Lentulidae* and from all other known subfamilies of *Acrididae*, except perhaps *Hemiacridinae*.

In the divided valves of the penis the *Lithidinae* approximate to *Hemiacridinae*,

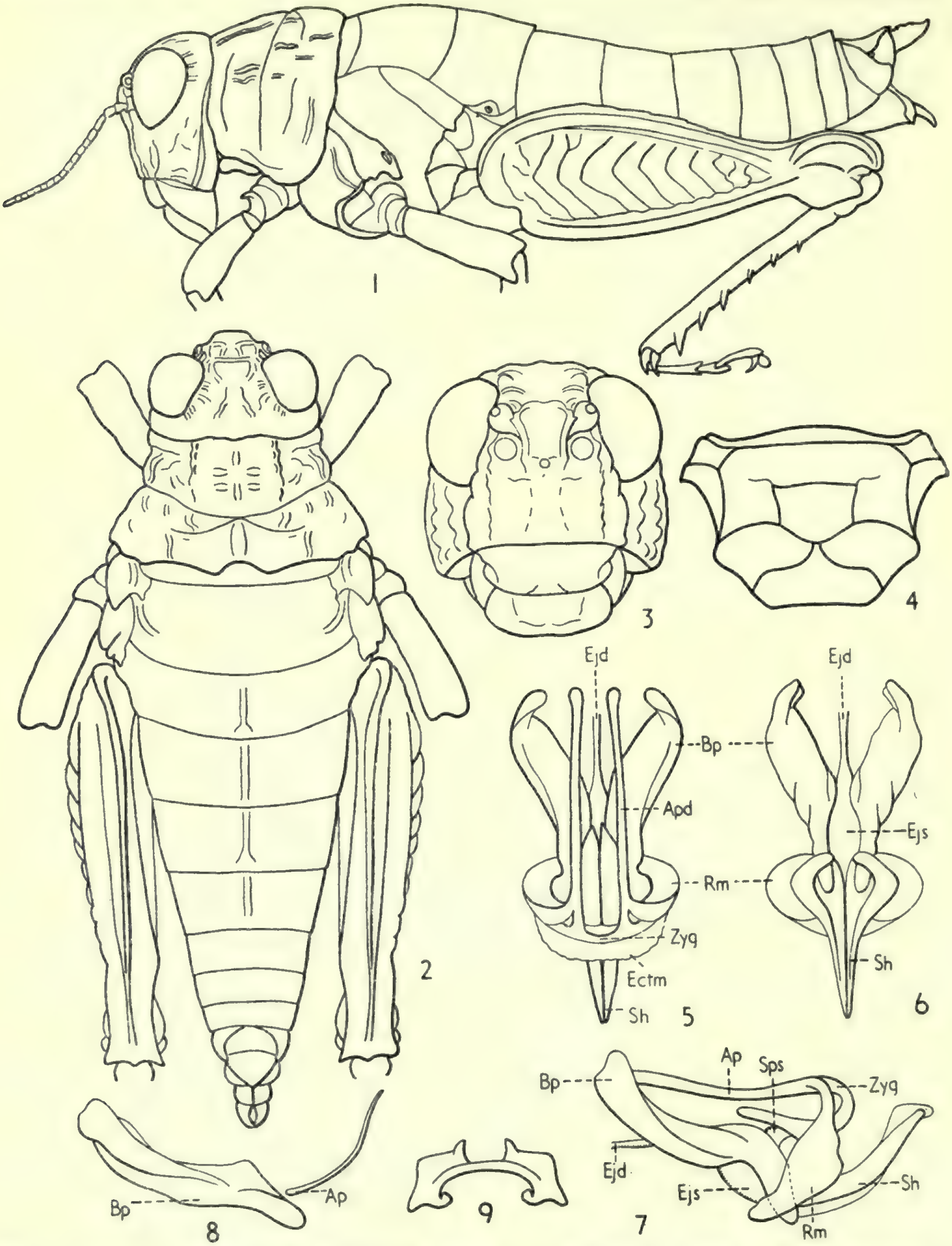
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FIG. 21. 1–4. *Lithidium bushmanicum* Dirsh. 1. Female, in profile. 2. The same, from above. 3. Face. 4. Meso- and metasternum. 5–9. Phallic complex of *Lithidium pusillum* Uv. 5. From above. 6. From below. 7. In profile. 8. Penis, in profile. 9. Epiphallus.

but the apical valves are strongly reduced. The epiphallus is rather simplified, with narrow bridge and simple, small ancorae and lophi. The latter character, the shape of the meso- and the metasternum and the absence of the tympanum even in winged species, preclude placing the *Lithidiinae* in *Hemiacridinae*.

The subfamily is found in S. and SW. Africa only.

List of known genera :

1. *Lithidium* Uvarov, 1925
2. *Lithidiopsis* Dirsh, 1956
3. *Microtmethis* Karny, 1910
4. ?*Eneremius* Saussure, 1888. (Known from females and its subfamily position is uncertain)

Subfamily ***Hemiacridinae***

(Text-fig. 22)

Type genus : *Hemiacris* Walker, 1870

Body of variable shape. Head prognathous, orthognathous or opisthognathous. Prosternal process present. Mesosternal interspace open or closed. Elytra and wings fully developed, reduced or absent ; radial area of elytron with series of regular, thickened, transverse, stridulatory veinlets. Tympanum present, in apterous forms absent. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia present or absent. Basal and apical valves of penis disconnected, but sometimes there is a tendency to form flexure. Epiphallus bridge-shaped, sometimes with divided bridge ; ancorae and lophi present.

The subfamily was established recently by Dirsh (1956) on the basis of divided valves of the penis and the presence of a peculiar stridulatory mechanism. The first character is shared with *Lithidiinae* and also links them to some extent with *Tropidopolinae*, which have a tendency towards disappearance of the flexure. The peculiar stridulatory mechanism does not occur in other subfamilies of *Acrididae*.

The subfamily is distributed in the tropics and subtropics of Africa, Asia, the Australasian Archipelago and Australia, and there are two genera in S. America.

List of examined genera :

1. *Acanthoxia* I. Bolivar, 1906
2. *Aleuas* Stål, 1878
3. *Bermius* Stål, 1878
4. *Calviniacris* Dirsh, 1956
5. *Castetsia* I. Bolivar, 1902
6. *Clonacris* Uvarov, 1943
7. *Diademacris* Ramme, 1929
8. *Dirshacris* Brown, 1959
9. *Gesonula* Uvarov, 1940
10. *Glauningia* Ramme, 1929
11. *Hemiacris* Walker, 1870
12. *Hemipristocorypha* Dirsh, 1952
13. *Hieroglyphus* Krauss, 1877
14. *Kassongia* I. Bolivar, 1908
15. *Leatettix* Dirsh, 1956
16. *Leptacris* Walker, 1870
17. *Lopheuthymia* Uvarov, 1943
18. *Loryma* Stål, 1878
19. *Malagasacris* Rehn, 1944
20. *Merehana* Kevan, 1957
21. *Mesopsera* I. Bolivar, 1908
22. *Oraistes* Karsch, 1896
23. *Parahieroglyphus* Carl, 1916
24. *Paraspathosternum* Ramme, 1929
25. *Pareuthymia* Willemse, 1930
26. *Perakia* Ramme, 1930
27. *Phalinus* Rehn, 1944
28. *Pristocorypha* Karsch, 1896
29. *Pseudocarsula* Kirby, 1914
30. *Spathosternum* Krauss, 1877
31. *Sudanacris* Uvarov, 1944
32. *Tarbaleus* Brunner, 1898
33. *Tauchira* Stål, 1878
34. *Uvarovidium* Dirsh, 1956
35. *Willemsella* Miller, 1934
36. *Xenippa* Stål, 1878
37. *Zygoclistron* Rehn, 1905

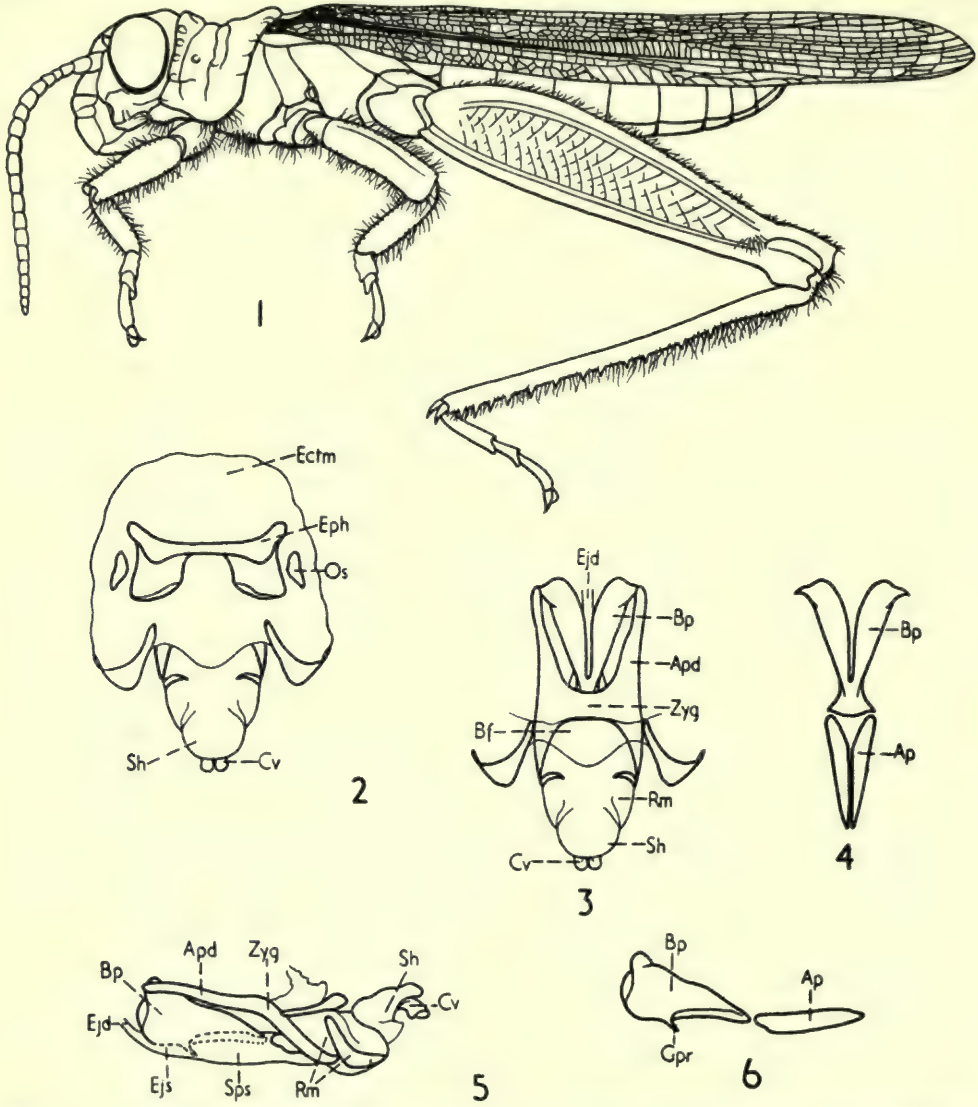
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FIG. 22. *Hemiacris fervens* Walk. 1. Male. 2–6. Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. Penis, from above. 5. As the fig. 3, but in profile. 6. Penis, in profile.

Subfamily ***Tropidopolinae***

(Text-fig. 23)

Type genus : *Tropidopola* Stål, 1873

Body cylindrical, elongated (sometimes strongly). Head from strongly elongated and acutely conical to subglobular. Median and lateral carinae of pronotum present or absent. Prosternal process beak-like or cylindrical or with widened, flat or concave apical surface. Mesosternal interspace closed. Elytra and wings fully developed or reduced. Tympanum present. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia present. Male cercus of variable shape. Flexure between basal and apical valves of penis has tendency to disappear. Epiphallus bridge-shaped, sometimes divided ; ancorae and lophi present. Stridulatory mechanism sometimes present (thickened veinlets in costal and subcostal areas of elytron).

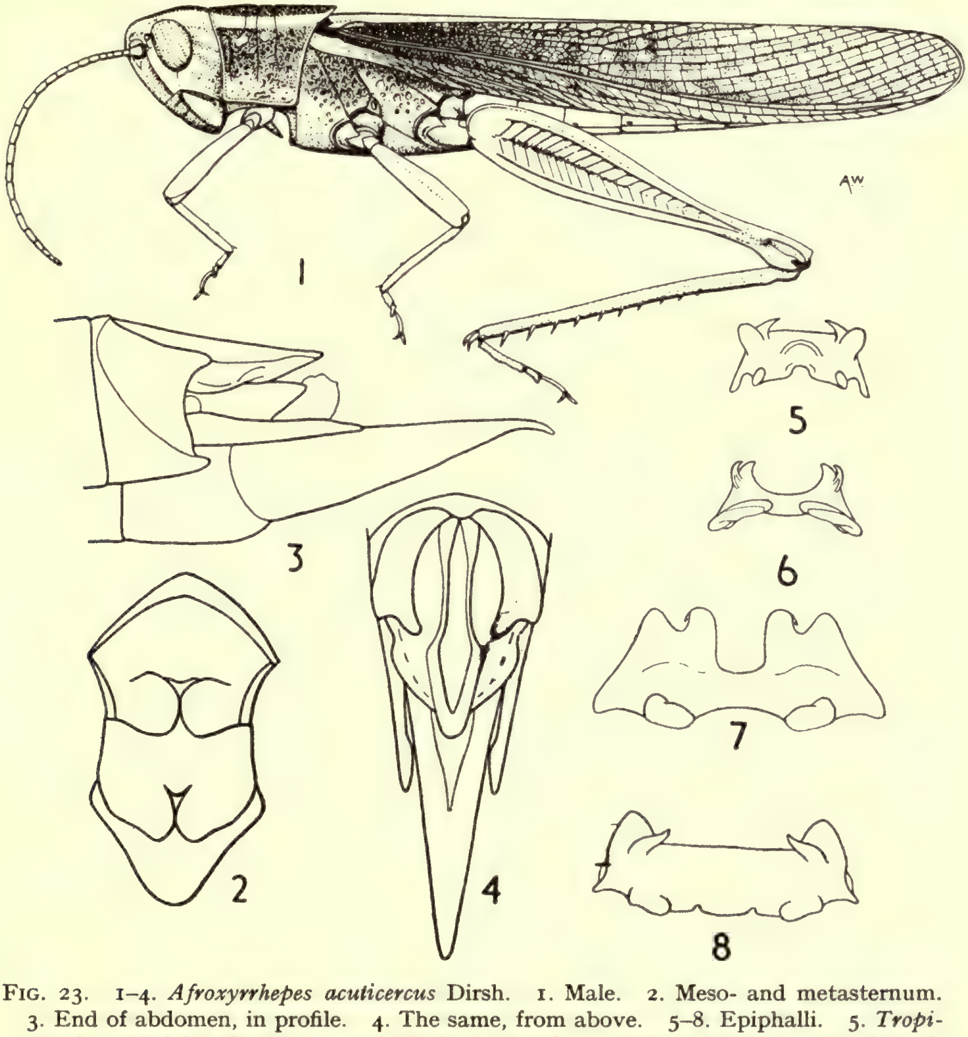

FIG. 23. 1–4. *Afroxyrrhepes acuticercus* Dirsh. 1. Male. 2. Meso- and metasternum. 3. End of abdomen, in profile. 4. The same, from above. 5–8. Epiphalli. 5. *Tropidopola cylindrica* (Marsh.). 6. *Tristria lacerta* St. 7. *Homoxyrrhepes punctipennis* (Walk.). 8. *Afroxyrrhepes procera* (Burm.).

There are four features, the combination of which characterizes this subfamily. These are the closed mesosternal interspace, the presence of an external apical spine on the hind tibia, a tendency towards losing the flexure between the basal and apical valves of the penis, and the shape of the prosternal process. None of these characters could be regarded as absolute, since they can be found separately in other subfamilies of *Acrididae*. However, their combination defines the *Tropidopolinae* as a natural group.

This subfamily is distributed in S. Asia and Africa, and with one genus reaching S. Europe.

List of examined genera :

1. *Afroxyrrhepes* Uvarov, 1943
2. *Bambusacris* Henry, 1933
3. *Calamippa* Henry, 1940
4. *Chloroxyrrhepes* Uvarov, 1926
5. *Homoxyrrhepes* Uvarov, 1926
6. *Limnippa* Uvarov, 1941
7. *Mesopsilla* Ramme, 1929
8. *Musimoja* Uvarov, 1953
9. *Oxyrrhepes* Stål, 1873
10. *Petamella* Giglio-Tos, 1907
11. *Tinnevellia* Henry, 1940
12. *Tristria* Stål, 1873
13. *Tropidopola* Stål, 1873

Subfamily ***Oxyinae***

(Text-fig. 24)

Type genus *Oxya* Serville, 1831

Size small or medium. Head subconical ; fastigium of vertex short. Pronotum cylindrical or subcylindrical ; median carina weak, linear or absent ; lateral carinae absent. Prosternal process conical. Mesosternal interspace open. Elytra and wings fully developed, shortened or absent. Tympanum present. Two or three distal abdominal sternites (in the majority of genera) with brush-like lateral groups of hairs. Lower basal lobe of hind femur shorter than upper one ; lower lobe of hind knee spine-like. Hind tibia (in the majority of cases) expanded ; external apical spine (except *Gerista*) present. Valves of ovipositor and female subgenital plate (in most genera) with teeth, spines or serration. Basal and apical valves of penis flexured. Epiphallus bridge shaped, with bridge divided or with tendency to division, with ancorae and lophi. Stridulatory mechanism not found.

Members of the subfamily *Oxyinae* form a natural assemblage which differs from the other subfamilies of *Acridoidea* in the presence of a spine-like lower lobe of the hind knee, the more or less divided bridge of the epiphallus and the hairy distal sternites of the abdomen. These characters are found in other subfamilies also, but their combination defines the *Oxyinae* reasonably well.

The subfamily *Oxyinae* is distributed in Africa, Asia and Australia.

List of examined genera :

1. *Austiniella* Ramme, 1931
2. *Badistica* Karsch, 1891
3. *Caledonia* Willemse, 1923
4. *Caryanda* Stål, 1878
5. *Cercina* Stål, 1878
6. *Chitaura* I. Bolivar, 1918
7. *Dapperia* Sjöstedt, 1921
8. *Dibastica* Giglio-Tos, 1907
9. *Digentia* Stål, 1878
10. *Genditia* I. Bolivar, 1911
11. *Gerista* I. Bolivar, 1905
12. *Lucretilis* Stål, 1878
13. *Oxya* Serville, 1831
14. *Pterotiltus* Karsch, 1893
15. *Quilta* Stål, 1860
16. *Racilia* Stål, 1878
17. *Zulua* Ramme, 1929

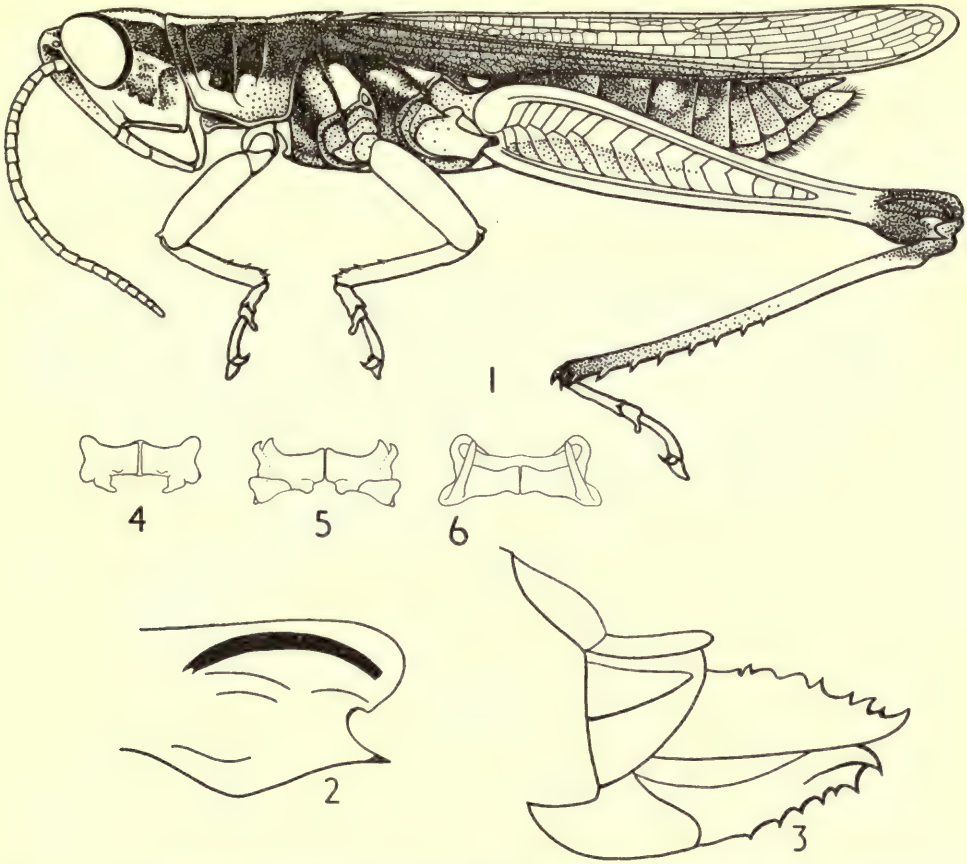

FIG. 24. 1–3. *Oxya hyla* Serv. 1. Male. 2. Hind knee, external side. 3. Ovipositor. 4–6. Epiphallus. 4. *Oxya hyla* Serv. 5. *Dibastica major* I. Bol. 6. *Pterotiltus inuncatus* (Karsh).

Subfamily ***Coptacridinae***

(Text-fig. 25)

Type genus : *Coptacra* Stål, 1873

Size small or medium. Head subconical ; occiput forming angle with vertex, mostly separated by ridge. Pronotum without lateral carinae. Prosternal process conical. Mesosternal interspace open. Elytra and wings fully developed or reduced. Tympanum present. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia absent. Last abdominal tergite of male mostly with furcula ; supra-anal plate mostly with attenuate apex ; subgenital plate with transverse fold. Male cercus widened in basal and compressed in apical half, with downcurved or complicatedly shaped apex. Basal and apical valves of penis flexured. Epiphallus bridge-shaped, with divided bridge ; ancorae and lophi present. Stridulatory mechanism not found.

The subfamily *Coptacridinae* was regarded as a group (Brunner, 1893), later as a tribe (Mistshenko, 1952), of *Catantopinae*, but when the characters were studied in more detail, it became necessary to separate it as a subfamily. The combination of characters is as follows: the divided bridge of the epiphallus; the presence, in the majority of genera, of a furcula on the last abdominal tergite of the male; the peculiar shape of the supra-anal plate and male cercus; a transverse fold in the subgenital plate of the male, and the separation of vertex and occiput. The two last characters are apparently peculiar to the *Coptacridinae*.

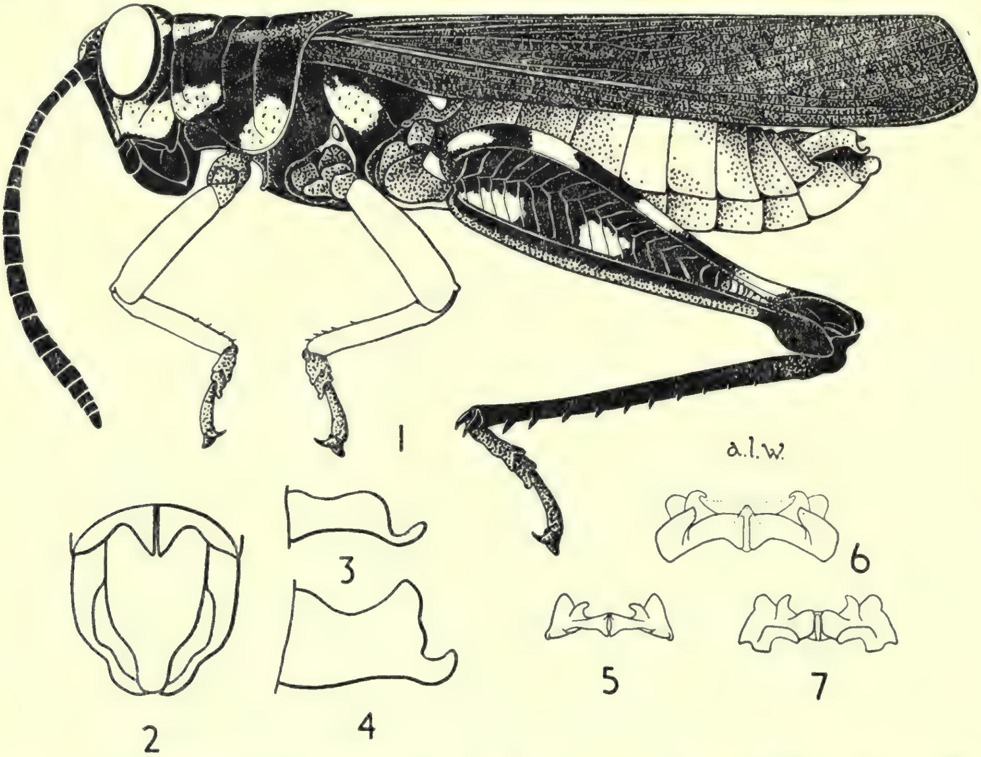

FIG. 25. 1–3. *Cyphocerastis laeta* Karsch. 1. Male. 2. End of abdomen from above. 3. Left cercus. 4. *Eucoptacra anguliflava* (Karsch), left cercus. 5–7. Epiphalli. 5. *Coptacra ensifera* I. Bol. 6. *Poecilocerastis striata* Ramme. 7. *Eucoptacra praemorsa* St.

The subfamily is distributed in tropical Africa and Asia.

List of examined genera :

1. *Apalacris* Walker, 1870
2. *Bocagella* I. Bolivar, 1889
3. *Coptacra* Stål, 1873
4. *Cyphocerastis* Karsch, 1891
5. *Dubitacris* Henry, 1938
6. *Epistaurus* I. Bolivar, 1889
7. *Eucoptacra* I. Bolivar, 1902
8. *Exochoderes* I. Bolivar, 1881
9. *Opharicus* Uvarov, 1940
10. *Paracoptacra* Karsch, 1896
11. *Parepistaurus* Karsch, 1896
12. *Poecilocerastis* Ramme, 1929
13. *Ruwenzoracris* Rehn, 1914
14. *Traulia* Stål, 1873

Subfamily ***Calliptaminae***

(Text-fig. 26)

Type genus : *Calliptamus* Serville, 1831

Size small to medium. Head subconical to subglobular ; frons in majority of genera vertical ; fastigium of vertex roundly merging with frontal ridge ; interocular distance wide. Pronotum with median and lateral carinae (lateral ones sometimes obliterated) ; dorsum crossed by three sulci. Prosternal process cylindrical, conical or antero-posteriorly compressed. Mesosternal interspace open. Elytra and wings fully developed or reduced. Tympanum present. Hind femur usually wide, its lower basal lobe shorter than upper one. External apical spine of hind tibia absent. Two last abdominal tergites of male fused, inflated and upcurved. Cercus large, strong, incurved, bilobate, adapted for gripping. Basal and apical

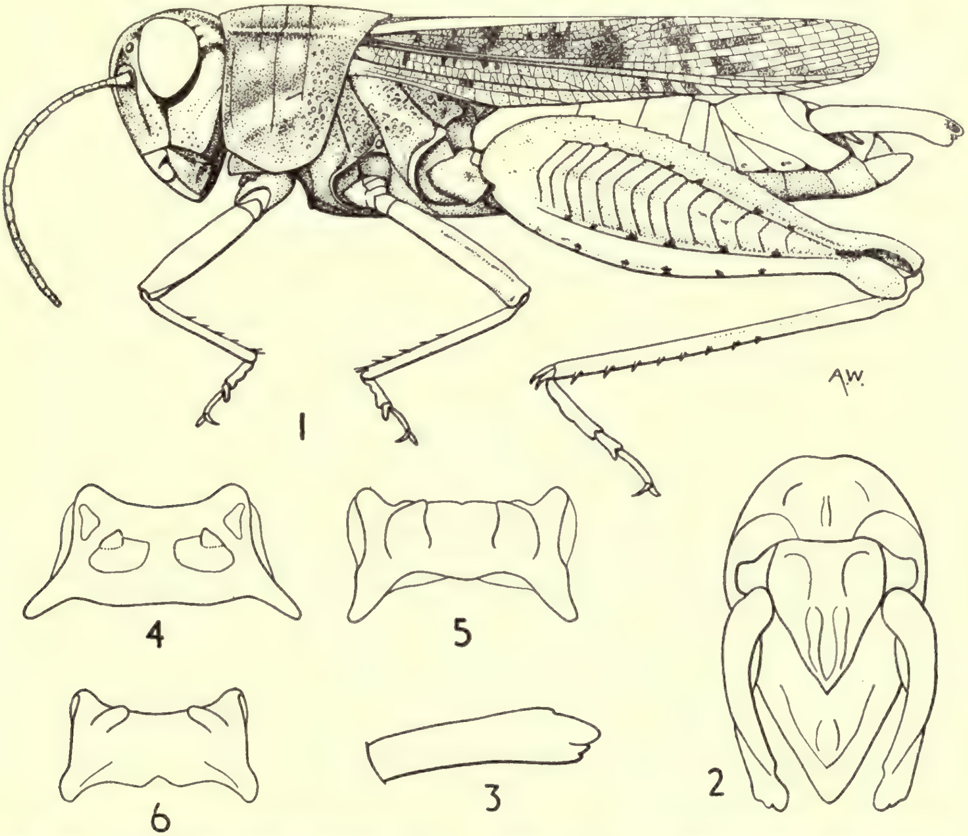

FIG. 26. 1–3. *Calliptamus italicus* (L.). 1. Male. 2. End of abdomen from above. 3. Male left cercus. 4–6. Epiphalli. 4. *Calliptamus italicus* (L.) 5. *Sphodromerus tuareg* Uv. 6. *Caloptenopsis glaucopsis* (Walk.).

valves of penis flexured. Epiphallus plate-like, mostly trapezoidal, with ancorae and without lophi. Stridulatory mechanism not found.

The subfamily *Calliptaminae* was erected by Jakobson (Jakobson & Bianki, 1904), but was disregarded as such by the majority of later authors; Mistshenko (1952) treated it as a tribe of *Catantopinae*. The representatives of this subfamily have a very characteristic plate-like epiphallus, not known in other subfamilies of *Acrididae*. The pincer-like male cerci also are peculiar, without close parallel in other subfamilies.

Calliptaminae are distributed in Europe, Africa and Asia.

List of known genera :

1. *Acorypha* Krauss, 1877
2. *Bosumia* Ramme, 1929
3. *Bothrocaracris* Uvarov, 1954
4. *Brachyxenia* Kirby, 1914
5. *Caloptenopsis* I. Bolivar, 1889
6. *Calliptamus* Serville, 1831
7. *Indomerus* Dirsh, 1951
8. *Palaciosa* C. Bolivar, 1930
9. *Paracaloptenus* I. Bolivar, 1876
10. *Peripolus* Martinez, 1902
11. *Sphodromerus* Stål, 1873
12. *Sphodronotus* Uvarov, 1943
13. *Stobbea* Ramme, 1929

Subfamily ***Euryphyminae***

(Text-fig. 27)

Type genus : *Euryphymus* Stål, 1873

Size small to medium. Antenna filiform. Head subconical to subglobular. Frons vertical or slightly oblique. Median and lateral carinae of pronotum present. Prosternal process present. Mesosternal interspace open. Elytra and wings fully developed, reduced or vestigial. Tympanum present. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia absent. Posterior margin of last abdominal tergite of male strongly sclerotized and slightly upcurved, with serrated or toothed edge. Male cercus of variable, mostly complicated shape, with expanded basal articulation. Ectophallic membrane with secondary sclerotization. Basal and apical valves of penis flexured. Epiphallus bridge-shaped, with divided bridge, lobiform ancorae and very large, tooth-shaped or elongate-lobiform lophi. Stridulatory mechanism not found.

The subfamily *Euryphyminae* was erected (Dirsh, 1956) mainly on the basis of the structure of the epiphallus, which is divided and has peculiar lophi, and the characteristic structure of the male cerci, with specialized basal articulation, which allows a wider range of movement of the cerci than in other groups. In both respects the subfamily is so well separated from all other subfamilies of *Acrididae* that it might be regarded as a family. However, the flexured basal and apical valves of the penis suggest that the *Euryphyminae* belong to the family *Acrididae*.

The subfamily *Euryphyminae* is distributed in S., SW., and E. Africa.

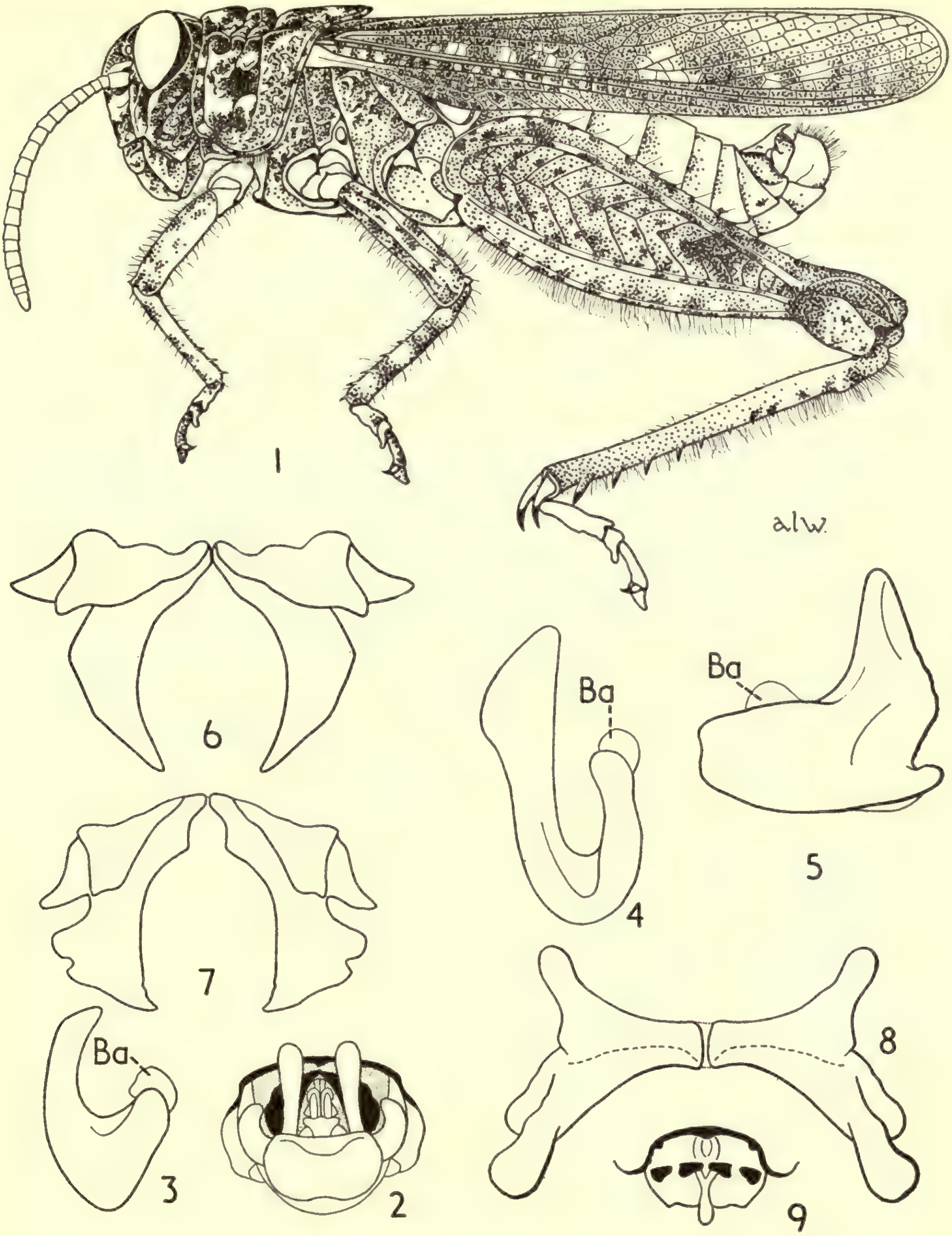

FIG. 27. 1. *Euryphymus haematopus* (L.), male. 2. *Amblyphymus rubripes* Uv., posterior end of male abdomen in precoital position, showing position of supra-anal plate (dotted), epiphallus (black) and cerci. 3–5. Cerci. 3. *Brachyphymus vylderi* St. (Ba, basal articulation). 4. *Amblyphymus miniatus* Uv. 5. *Acrophymus ocreatus* Uv. 6–8. Epiphalli. 6. *Brachyphymus vylderi* St. 7. *Amblyphymus miniatus* Uv. 8. *Acrophymus ocreatus* Uv. 9. Posterior margin of the last abdominal tergite and supra-anal plate of *Amblyphymus miniatus* Uv., showing strong sclerotization.

List of known genera :

1. *Acoryphella* Giglio-Tos, 1907
2. *Acrophymus* Uvarov, 1922
3. *Amblyphymus* Uvarov, 1922
4. *Anabibia* Dirsh, 1956
5. *Aneuryphymus* Uvarov, 1922
6. *Brachyphymus* Uvarov, 1922
7. *Calliptamicus* Uvarov, 1922
8. *Calliptamuloides* Dirsh, 1956
9. *Calliptamulus* Uvarov, 1922
10. *Euryphymus* Stål, 1873
11. *Kevanacris* Dirsh, 1961
12. *Pachyphymus* Uvarov, 1922
13. *Phymeurus* Giglio-Tos, 1907
14. *Platacanthoides* Kirby, 1910
15. *Plegmapteroides* Dirsh, 1959
16. *Plegmapteropsis* Dirsh, 1956
17. *Plegmapterus* Martinez, 1898
18. *Rachitopis* Uvarov, 1922
19. *Rhodesiana* Dirsh, 1959
20. *Somaliacris* Dirsh, 1956
21. *Surudia* Uvarov, 1930

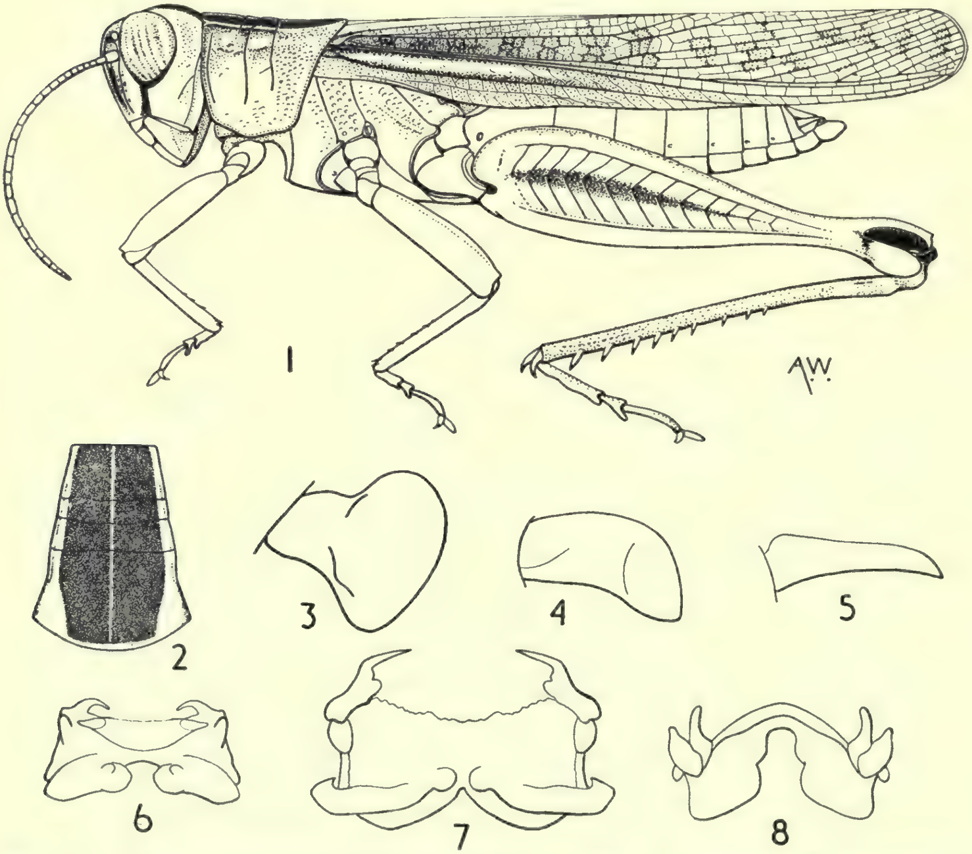

FIG. 28. 1–2. *Eyprepocnemis plorans* (Charp.). 1. Male. 2. Dorsum of pronotum, showing characteristic pattern. 3–5. Male cerci. 3. *Phyllocercus bicoloripes* Uv. 4. *Heteracris herbacea* (Serv.). 5. *Eyprepocnemis plorans* (Charp.). 6–8. Epiphalli. 6. *Heteracris calliptamoides* Uv. 7. *Phyllocercus bicoloripes* Uv. 8. *Eyprepocnemis plorans* Charp.

Subfamily ***Eyprepocnemidinae***

(Text-fig. 28)

Type genus : *Eyprepocnemis* Fieber, 1853

Size small to large. Head subconical to subglobular. Fastigium of vertex merging roundly with frontal ridge ; inter-ocular distance wide. Pronotum with median and lateral carinae (lateral sometimes obliterated) ; dorsum crossed by three sulci. Prosternal process cylindrical or antero-posteriorly compressed. Mesosternal interspace open. Elytra and wings fully developed or reduced. Tympanum present. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia absent. Male cercus at apex flattened, widened or subacute and down curved. Basal and apical valves of penis flexured. Epiphallus bridge-shaped, mostly with poorly sclerotized bridge ; ancorae and lophi present. Stridulatory mechanism not found.

The subfamily *Eyprepocnemidinae* was established by Jakobson (Jakobson & Bianki, 1904), but was disregarded by later authors and considered as part of the subfamily *Catantopinae* and recently (Mistshenko, 1952) as a tribe of it.

The subfamily is defined by the following combination of characters : a weakly sclerotized and rather wide bridge of the epiphallus, with curved and sometimes rather complicated ancorae ; slender hind femur (with few exceptions) ; rounded and rather wide fastigium of the vertex ; presence of lateral carinae on the pronotum (rarely obliterated) ; and apically compressed male cerci. These characters are not confined to the *Eyprepocnemidinae*, but their combination defines the *Eyprepocnemidinae* as a natural group.

Eyprepocnemidinae are distributed in Africa, S. Europe, Asia and Australia.

List of examined genera :

1. *Amphiprosopia* Uvarov, 1921
2. *Asmara* I. Bolivar, 1914
3. *Belonocnemis* I. Bolivar, 1914
4. *Brownacris* Dirsh, 1958
5. *Burmacris* Ramme, 1941
6. *Cataloipus* I. Bolivar, 1890
7. *Choroedocus* I. Bolivar, 1914
8. *Cyathosternum* I. Bolivar, 1881
9. *Cyclopternacris* Ramme, 1928
10. *Macrotona* Brunner, 1893
11. *Euprepocnemides* I. Bolivar, 1914
12. *Eyprepocnemis* Fieber, 1853
13. *Eupreponotus* Uvarov, 1921
14. *Habrocnemis* Uvarov, 1930
15. *Heteracris* Walker, 1870
16. *Horaeocerus* Saussure, 1899
17. *Jucundacris* Uvarov, 1921
18. *Macrocara* Uvarov, 1930
19. *Navasia* Kirby, 1914
20. *Oxyaeida* I. Bolivar, 1914
21. *Paraeuprepocnemis* Brunner, 1893
22. *Parathisoicetrus* Ramme, 1929
23. *Phyllocercus* Uvarov, 1941
24. *Taramassus* Giglio-Tos, 1907
25. *Thisoicetrellus* Uvarov, 1921
26. *Thisoicetrinus* Uvarov, 1921
27. *Tropidiopsis* I. Bolivar, 1911
28. *Tylotropidius* Stål 1873

Subfamily ***Catantopinae***

(Text-fig. 29)

Type genus : *Catantops* Schaum, 1853

Size from small to large. Head of variable shape. Median carina of pronotum present or absent ; lateral carinae only rarely present. Prosternal process present.

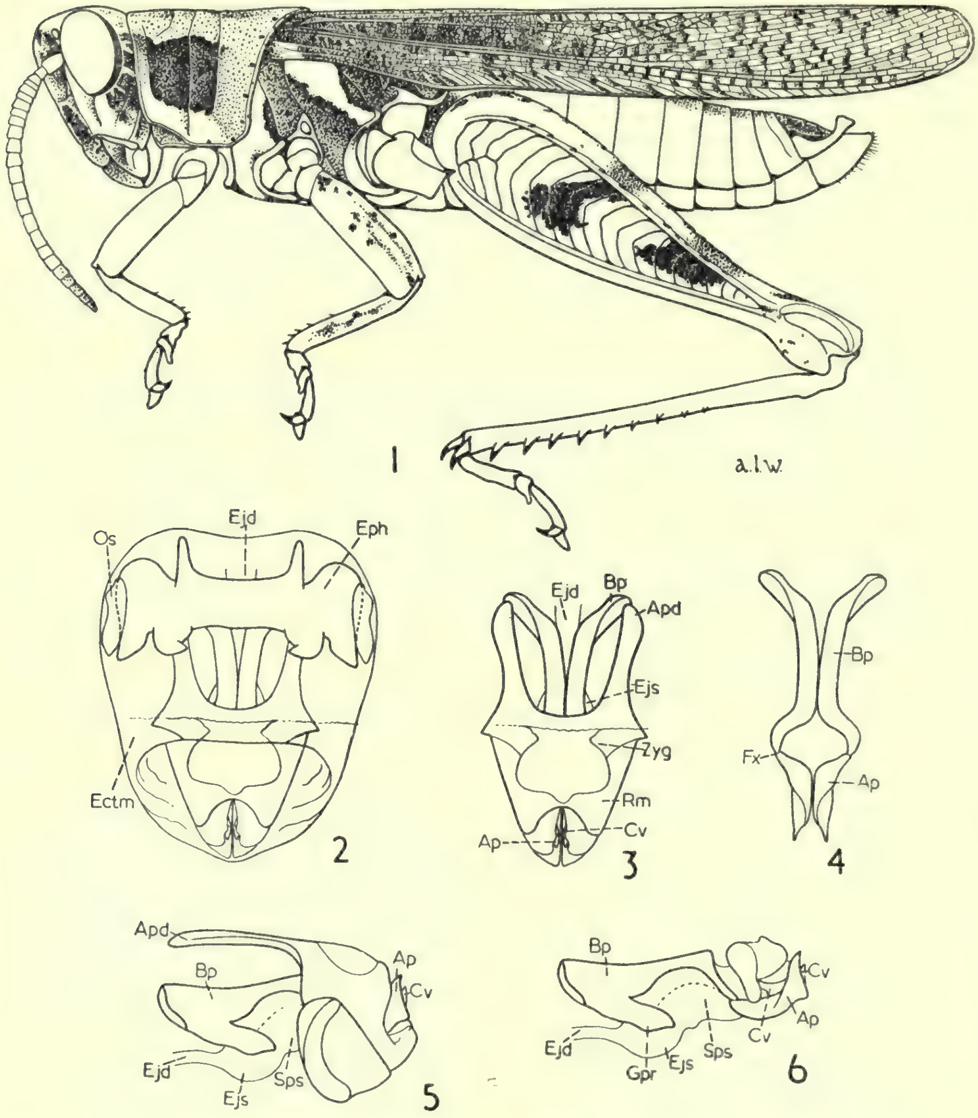
1
a.l.w.
Os
Ejd
Eph
Ectm
2
Ejd
Bp
Apd
Ejs
Zyg
Rm
Cv
Ap
3
Bp
Fx
Ap
4
Apd
Bp
Ap
Cv
Ejd
Ejs
Sps
5
Bp
Cv
Ap
Cv
Ejd
Gpr
Ejs
Sps
6

FIG. 29. *Catantops melanostictus* Schaum. 1. Male. 2–6. Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. Penis, from above. 5. As fig. 3, but in profile. 6. Endophallus, in profile.

Mesosternal lobes rounded. Elytra and wings fully developed, reduced or absent; intercalary vein of medial area of elytron absent (rarely present). Tympanum normally present, rarely absent. Lower basal lobe of hind femur normally shorter than upper one. External apical spine of hind tibia present or absent. Basal and apical valves of penis flexured. Epiphallus bridge-shaped, sometimes with divided bridge; ancorae mostly present; lophi of variable form, mostly present. Stridulatory mechanism not found.

The *Catantopinae* are closely related to *Cyrtacanthacridinae* and *Acridinae*, but may be separated from *Cyrtacanthacridinae* by the rounded mesosternal lobes; and from *Acridinae* by the presence of a prosternal process, the absence of an intercalary vein in the medial area of the elytron and the non-articulated ancorae of the epiphallus, although these three characters do occur in certain *Acridinae*.

The subfamily urgently needs further study. It would be premature to attempt to subdivide it now, since there must be a large number of undescribed genera, particularly in the tropics.

The large subfamily *Catantopinae*, even in its present reduced scope, still represents a highly heterogeneous assemblage. It was usual to put into the subfamily any genus which would not fit elsewhere. As a result, the subfamily not only contains the basic group *Catantopini* but has also been a dumping ground for everything which needs further investigation.

The subfamily *Catantopinae* is distributed in the whole world, and includes a large number of genera. No list is given for obvious reasons.

Subfamily ***Cyrtacanthacridinae***

(Text-fig. 30)

Type genus: *Cyrtacanthacris* Walker, 1870

Size large or medium. Antenna filiform. Head subglobular; frons vertical. Pronotum without lateral carinae; dorsum crossed by three sulci. Prosternal process large. Mesosternal interspace open; mesosternal lobes rectangular. Elytra and wings fully developed or reduced. Tympanum present. Lower basal lobe of hind femur shorter than upper one. External apical spine of hind tibia absent. Basal and apical valves of penis flexured. Epiphallus robust, bridge-shaped, with small or without any ancorae; lophi large lobiform or tooth-like. Stridulatory mechanism not found.

The main characteristic features of *Cyrtacanthacridinae* are the rectangular mesosternal lobes, the large size of the body, the strong epiphallus, with the ancorae shortened or absent, and the absence of lateral carinae on the pronotum.

It might be possible to regard *Cyrtacanthacridinae* as a group or a tribe within the subfamily *Catantopinae*, but their characters are sufficiently definite for them to be regarded as a separate subfamily.

The subfamily is distributed over the tropical, subtropical and temperate zones of the whole world.

List of known genera :

1. *Acanthacris* Uvarov, 1924
2. *Acridoderes* I. Bolivar, 1889
3. *Adramita* Uvarov, 1936
4. *Anacridium* Uvarov, 1923
5. *Austracris* Uvarov, 1924
6. *Bryophyma* Uvarov, 1923
7. *Chondracris* Uvarov, 1924
8. *Congoa* I. Bolivar, 1911
9. *Cyrtacanthacris* Walker, 1870
10. *Finotina* Uvarov, 1924
11. *Gowdeya* Uvarov, 1923
12. *Kinkalidia* Sjöstedt, 1931
13. *Kraussaria* Uvarov, 1924
14. *Melicodes* Uvarov, 1923
15. *Nomadacris* Uvarov, 1924
16. *Ootua* Uvarov, 1927
17. *Ornithacris* Uvarov, 1924
18. *Orthacanthacris* Karsh, 1896
19. *Pachyacris* Uvarov, 1923
20. *Pachynotacris* Uvarov, 1923
21. *Patanga* Uvarov, 1923
22. *Phyxacra* Karny, 1907
23. *Rhadinacris* Uvarov, 1923
24. *Rhytidacris* Uvarov, 1923
25. *Schistocerca* Stål, 1873
26. *Valanga* Uvarov, 1923
27. *Willemsea* Uvarov, 1923

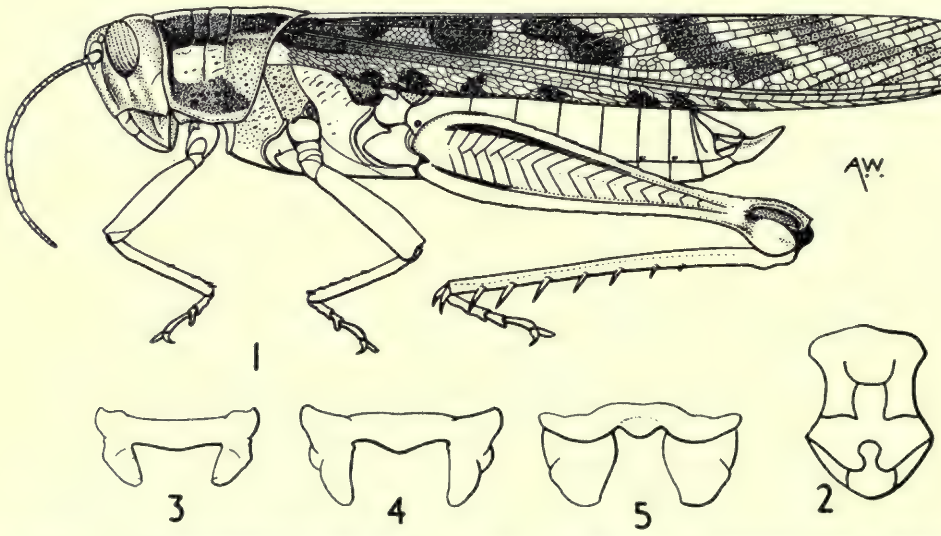

FIG. 30. 1. *Cyrtacanthacris tatarica* (L.), male. 2. Meso- and metasternum of *Schistocerca gregaria* Forsk. 3–5. Epiphalli. 3. *Cyrtacanthacris tatarica* (L.). 4. *Ornithacris cyanea* (Stoll). 5. *Anacridium aegyptium* (L.).

Subfamily ***Egnatiinae***

(Text-fig. 31)

Type genus : *Egnatius* Stål, 1876

Small. Head subconical. Median and lateral carinae of pronotum present. Prosternum with low convexity. Mesosternal interspace very short, mesosternal furcal suture being strongly curved backwards. Elytra and wings fully developed or reduced ; weak intercalary vein of medial area of elytron present or absent. Tympanum present. Abdominal tergites of male, on sides, often with transverse stridulatory ridges. Arolium very small. Basal and apical valves of penis flexured. Epiphallus bridge-shaped ; ancorae articulated with bridge ; lophi present.

The affinities of the subfamily *Egnatiinae* are rather obscure. Not long ago the genera concerned were regarded as members of the *Oedipodinae*. Bey-Bienko (1951) recognized them as a separate subfamily on the basis of the peculiar shape of the mesosternal furcal suture, the peculiar stridulatory mechanism in some of the genera and the poor development or absence of a vena intercalata in the medial area of the elytron. Slifer (1939) noticed that they possess Comstock-Kellogg glands, which are otherwise believed to occur only in *Catantopinae*. Bryantseva (1953) studied the foregut in *Egnatiinae*, and found that the folds and sculpture of its internal surface are similar to those in *Catantopinae* and different from those of *Oedipodinae*. On this basis it can be suggested that they are nearer to the *Catantopinae* than to any other subfamily.

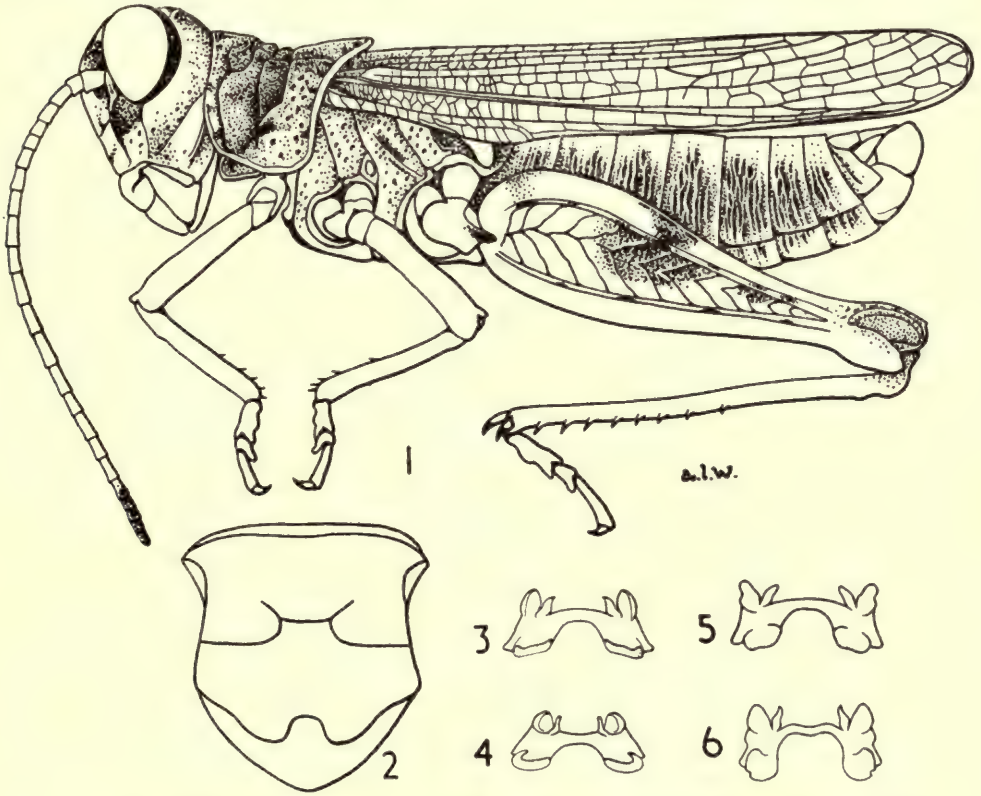

FIG. 31. 1–2. *Egnatius apicalis* St. 1. Male. 2. Meso- and metasternum. 3–6. Epiphalli. 3. *Charora crassivenosa* Sauss. 4. *Egnatius apicalis* St. 5. *Egnatiella cabrerai* I. Bol. 6. *Leptoscirtus isphahanicus* Uv.

The *Egnatiinae* are distributed in N. Africa and SW. Asia.

List of known genera :

1. *Charora* Saussure, 1888
2. *Egnatius* Stål, 1876
3. *Egnatioides* Vosseler, 1902
4. *Egnatiella* I. Bolivar, 1914
5. *Leptoscirtus* Saussure, 1888
6. *Paregnatius* Uvarov, 1933

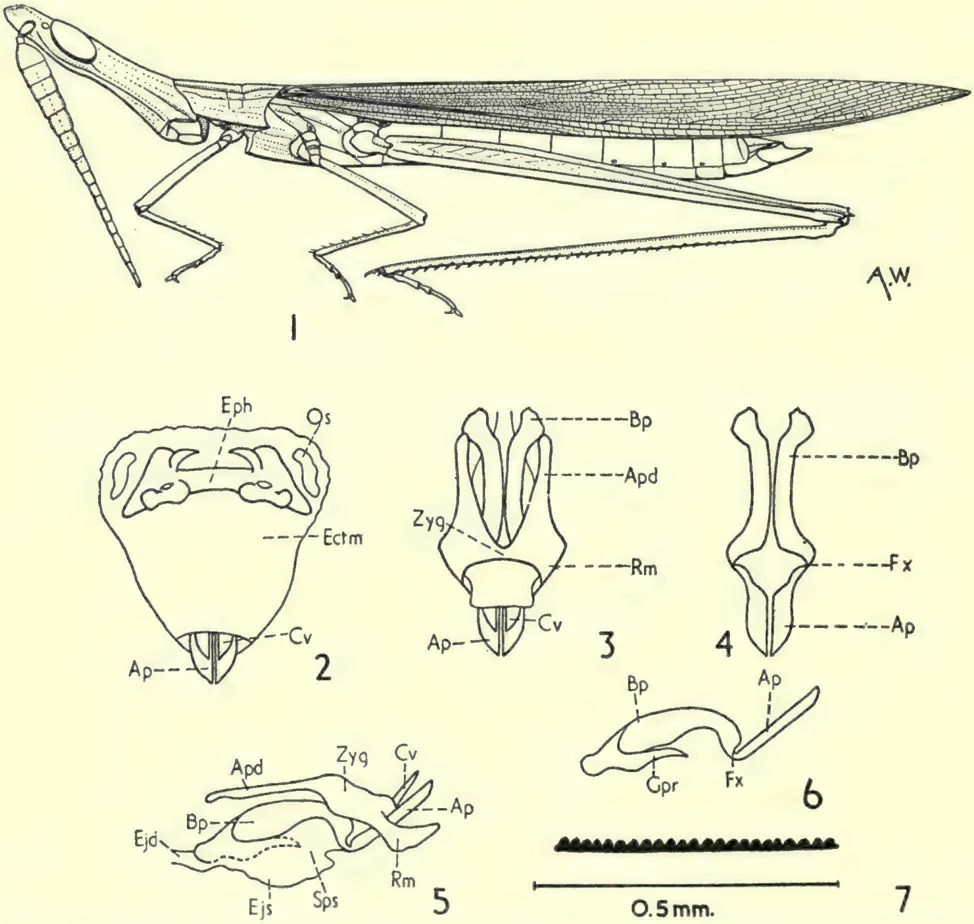
A.W.
1
Eph
Os
Ectm
Cv
Ap
2
Bp
Apd
Zyg
Rm
Cv
Ap
3
Bp
Fx
Ap
4
Bp
Ap
Gpr
Fx
6
Apd
Zyg
Cv
Ap
Bp
Ejd
Rm
Ejs
Sps
5
0.5 mm.
7

FIG. 32. *Acrida turrita* L. 1. Male. 2–6 Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. Penis from above. 5. As fig. 3, but in profile. 6. Penis, in profile. 7. Serrated intercalary vein of *Oedipoda miniata* (Pall.).

Subfamily ***Acridinae***

(Text-fig. 32)

Type genus : *Acrida* Linnaeus, 1758

Size small to large. Head of variable shape. Median and lateral carinae of pronotum mostly present. Prosternal process mostly absent. Elytra and wings fully developed, reduced or absent; intercalary vein of medial area of elytron sometimes strong and serrated, sometimes weak, disappearing, but mostly present. Stridulatory mechanism, consisting of variable serration of elytra or wings, often present. Tympanum normally present. Lower basal lobe of hind femur shorter than upper one. Basal and apical valves of penis flexured. Epiphallus bridge-shaped; ancorae mostly present, articulated with bridge; lophi mostly present.

The subfamily *Acridinae* is related on the one hand to *Catantopinae*, on the other to *Truxalinae*.

The presence in some genera of a prosternal process connects them with *Catantopinae*, from which they differ, however, in the combination of other characters (see *Catantopinae*). From *Truxalinae* they differ clearly in the absence of stridulatory serration on the internal side of the hind femur. In the case of wingless genera and species, however, it is extremely difficult to decide to what subfamily they belong, since the phallic complex of *Acridinae* and *Truxalinae* does not provide clear separating features. The subfamily may be divided into several groups or tribes and one of them could be *Oedipodini*, which has been in the past regarded as a subfamily, mainly on the grounds of general appearance. Dirsh (1956) reduced it to a group. The only diagnostic character of *Oedipodini* suggested by Uvarov (1942), the serrated intercalary vein of the medial area of the elytra, is not reliable since there is a full transition to the *Acridinae*, the intercalary vein of which may be serrated, irregular, or altogether absent.

The *Acridinae* are distributed throughout the world and include a vast number of genera, a list of which would be superfluous.

Subfamily ***Eremogryllinae***

(Text-fig. 33)

Type genus: *Eremogryllus* Krauss, 1902

Small. Head subconical or subglobular. Pronotum with median and lateral carinae. Prosternum with low, transverse convexity and slightly raised anterior margin. Mesosternal interspace short and wide. Elytra and wings fully developed; elytron with sharp radial vein (stridulatory specialization); intercalary vein of medial area absent. Tympanum present. Stridulatory serration, consisting of articulated pegs on internal side of hind femur present; lower basal lobe of hind femur shorter than upper one. Male cercus short, thickened, with incurved, acute apex. Subgenital plate shortened, transverse. Phallic complex relatively very small. Basal and apical valves of penis flexured. Epiphallus with divided bridge; ancorae small, incurved; lophi tooth-like, with strongly acute apices.

The subfamily *Eremogryllinae* was established recently (Dirsh, 1956) mainly on the basis of the peculiar structure of the epiphallus and the external genital appendages of the male. It shares the type of stridulatory mechanism with *Truxalinae* but the structure of the phallic complex is very different. There is no close relationship between *Eremogryllinae* and the other subfamilies of *Acrididae*.

The *Eremogryllinae* occur only in N. Africa.

List of known genera:

1. *Eremogryllus* Krauss, 1902
2. *Notopleura* Krauss, 1902

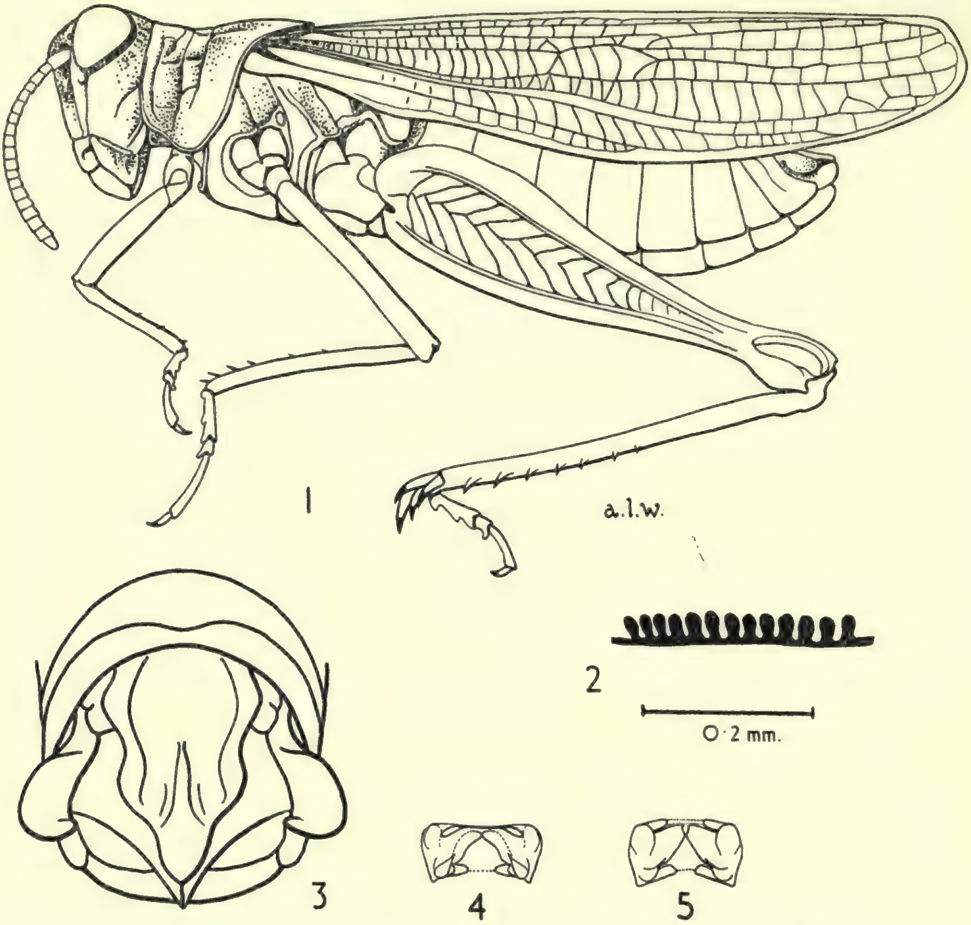

Fig. 33. 1–4. *Eremogryllus hammadae* Kr. 1. Male. 2. Stridulatory serration on internal side of hind femur. 3. End of male abdomen from above. 4. Epiphallus. 5. Epiphallus of *Notopleura saharica* Kr.

Subfamily ***Truxalinae***

(Text-fig. 34)

Type genus : *Truxalis* Fabricius, 1775

Size from small to large. Head of variable shape. Median and lateral carinae of pronotum mostly present. Prosternal process absent, rarely present. Elytra and wings fully developed or reduced ; radial or radial and medial vein of elytron sharp (stridulatory specialization) ; intercalary vein of medial area absent. Tympanum present. Lower basal lobe of hind femur shorter than upper one ; stridulatory serration with articulated or not articulated pegs on internal side of hind femur present. Basal and apical valves of penis flexured. Epiphallus bridge-shaped ; ancorae articulated with bridge ; lophi present.

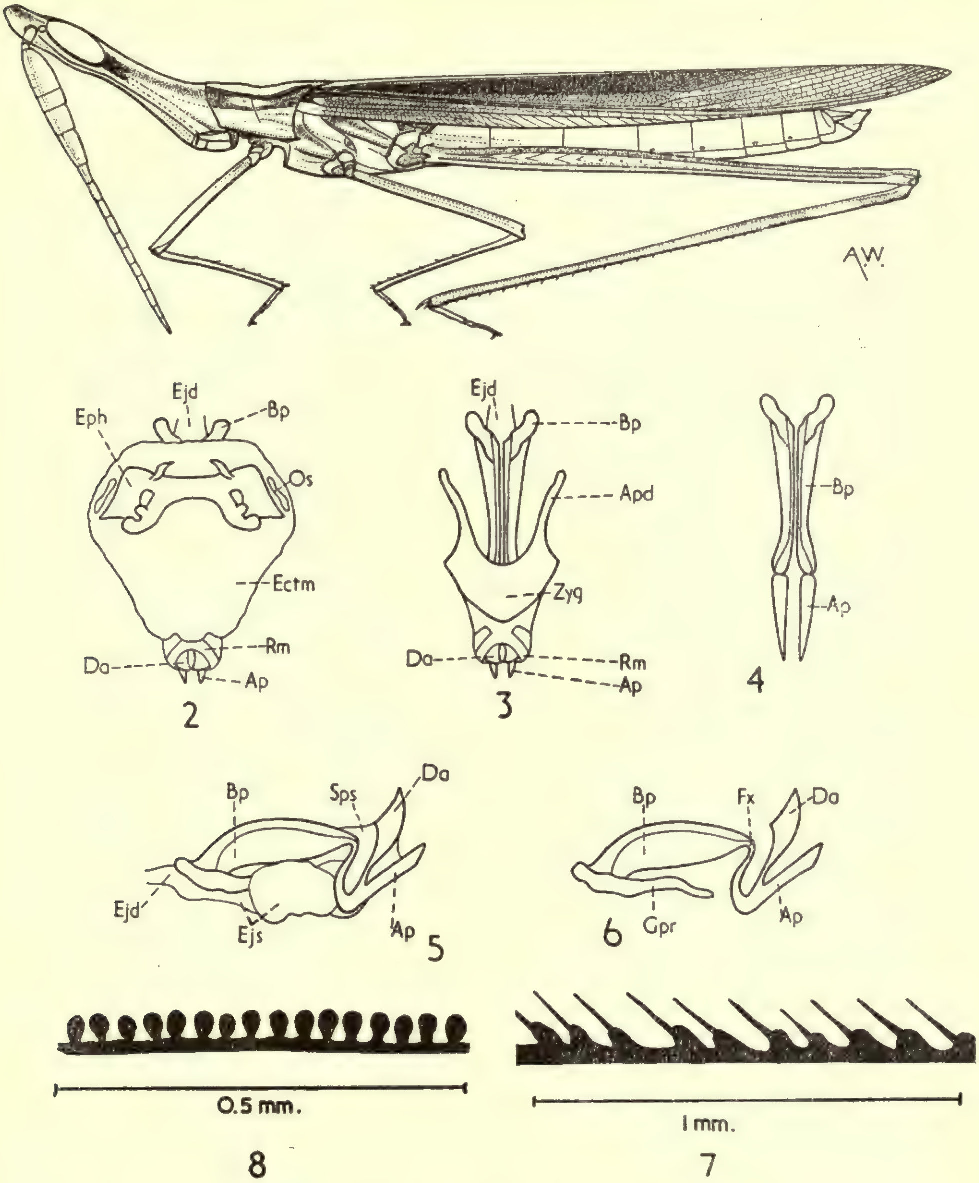
A.W.
Ejd
Eph
Bp
Os
Ectm
Rm
Da
Ap
2
Ejd
Bp
Apd
Zyg
Da
Rm
Ap
3
Bp
Ap
4
Bp
Sps
Da
Ejd
Ejs
Ap
5
Bp
Fx
Da
Gpr
Ap
6
0.5 mm.
8
1 mm.
7

FIG. 34. *Truxalis grandis* Klug. 1. Male. 2–6. Phallic complex. 2. Whole phallic complex from above. 3. The same, but ectophallic membrane and epiphallus removed. 4. Penis from above. 5. As fig. 3, but in profile. 6. Penis in profile. 7. Stridulatory serration on internal side of hind femur (not articulated). 8. *Gomphocerus sibiricus* (L.), stridulatory serration (articulated).

The name *Truxalinae* has been used by many authors for the complex which is now divided into *Acridinae* and *Truxalinae*. Externally, representatives of both subfamilies present a series of parallel forms, but *Truxalinae* possess a stridulatory mechanism of a definite structure, found elsewhere only in *Eremogryllinae*. A somewhat similar structure is found in two South American genera of *Catantopinae* (see p. 358).

It might be argued that a single character is insufficient for separating the *Truxalinae* from the *Acridinae*, but it consists of a complicated structure of articulated or non-articulated stridulatory pegs, combined with the second part of the mechanism comprising sharp veins for friction and often widened areas of the elytron which serve as resonators. This highly specialized stridulatory mechanism constitutes a character so well defined that no confusion between winged members of the two subfamilies can possibly arise. There are no intermediate forms between *Truxalinae* and other subfamilies.

The *Truxalinae* are distributed throughout the world except Australia and Madagascar.

List of examined genera:

1. *Acantherus* Scudder, 1902
2. *Achurum* Saussure, 1861
3. *Acocksacris* Dirsh, 1958
4. *Acridarachnea* I. Bolivar, 1908
5. *Acrolophitus* Thomas, 1871
6. *Afrohippus* Uvarov, 1941
7. *Ageneotettix* McNeil, 1897.
8. *Amblytropidia* Stål, 1873
9. *Amesotropis* Karsch, 1893
10. *Amphitornus* McNeil, 1897
11. *Anablepia* Uvarov, 1938
12. *Anaptygus* Mistshenko, 1951
13. *Arcyptera* Serville, 1839
14. *Aswatthamanus* Kirby, 1914
15. *Aulacobothrus* I. Bolivar, 1902
16. *Aulocara* Scudder, 1876
17. *Azarea* Uvarov, 1926
18. *Baidoceracris* Chopard, 1947
19. *Bodenheimerella* Uvarov, 1933
20. *Bootettix* Bruner, 1890.
21. *Brachycrotaphus* Krauss, 1877
22. *Brainia* Uvarov, 1922
23. *Capulica* I. Bolivar, 1918
24. *Clinocephalus* Morse, 1896.
25. *Chloealtis* Harr, 1841
26. *Chorthippus* Fieber, 1852
27. *Chromotruxalis* Dirsh, 1951
28. *Chrysochraon* Fischer, 1853.
29. *Cophohippus* Uvarov, 1953
30. *Cordillacris* Rehn, 1901
31. *Dhimbama* Henry, 1940
32. *Diablepia* Kirby, 1902
33. *Dichromorpha* Morse, 1896
34. *Dnopherula* Karsch, 1896
35. *Dociostaurus* Fieber, 1853
36. *Eleutherotheca* Karny, 1907.
37. *Eremiacris* Hebard, 1929
38. *Eremippus* Uvarov, 1926
39. *Eritettix* Bruner, 1890
40. *Ermia* Popov, 1957
41. *Euchorthippus* Tarbinsky, 1925
42. *Euplectrotettix* Bruner, 1902
43. *Eupnigodes* McNeil, 1897
44. *Euthystira* Fieber, 1853
45. *Faureia* Uvarov, 1921
46. *Gomphocerippus* Roberts, 1941
47. *Gomphocerus* Thunberg, 1815
48. *Goniatron* Bruner, 1905
49. *Goniocara* Uvarov, 1953
50. *Heliaula* Caudell, 1915
51. *Kirmania* Uvarov, 1933
52. *Komandia* Uvarov, 1953
53. *Krausella* I. Bolivar, 1909
54. *Leuconotus* Bruner, 1904
55. *Leva* I. Bolivar, 1909
56. *Ligurotettix* McNeil, 1897
57. *Lounsburyna* Uvarov, 1922
58. *Macneillia* Scudder, 1898
59. *Madurea* I. Bolivar, 1902
60. *Mermiria* Stål, 1873
61. *Mesochloa* Scudder, 1898
62. *Mesopsis* I. Bolivar, 1906
63. *Milleriola* Uvarov, 1953
64. *Mizonocara* Uvarov, 1912

65. *Mongolotettix* Rehn, 1928
66. *Morseiella* Hebard, 1925
67. *Myrmeleotettix* I. Bolivar, 1914
68. *Napaia* McNeil, 1897
69. *Notostaurus* Bey-Bienko, 1933
70. *Ochrilidia* Stål, 1873
71. *Omocestus* I. Bolivar, 1878
72. *Opeia* McNeil, 1897
73. *Oxytruxalis* Dirsh, 1950
74. *Paragonista* Willemse, 1932
75. *Paragymnobothrus* Karny, 1910
76. *Pararcyptera* Tarbinsky, 1930
77. *Paropomala* Scudder, 1899
78. *Pedioscirtetes* Thomas, 1873
79. *Peruvia* Scudder, 1890
80. *Phlibostroma* Scudder, 1875
81. *Phonogaster* Henry, 1940
82. *Phorenula* I. Bolivar, 1909
83. *Platypternodes* I. Bolivar, 1908
84. *Pnorisa* Stål, 1861
85. *Podismopsis* Zubowsky, 1899.
86. *Primnia* Stål, 1873
87. *Pesctrocnemus* Henry, 1940
88. *Pseudegnatius* Dirsh, 1956
89. *Pseudoarcyptera* I. Bolivar, 1909
90. *Pseudogmothela* Karny, 1910
91. *Pseudopomala* Morse, 1896
92. *Psoloessa* Scudder, 1875
93. *Ptygonotus* Tarbinsky, 1927
94. *Quangula* Uvarov, 1953
95. *Ramburiella* I. Bolivar, 1906
96. *Raphotitta* Karsch, 1896
97. *Scyllina* Stål, 1873
98. *Silvitettix* Bruner, 1904
99. *Sinipta* Stål, 1860
100. *Sporobolius* Uvarov, 1941
101. *Stauroderus* I. Bolivar, 1897
102. *Staurorhectus* Giglio-Tos, 1897.
103. *Stenobothrus* Fischer, 1853
104. *Stenohippus* Uvarov, 1926
105. *Stirapleura* Scudder, 1876
106. *Syrbula* Stål, 1873.
107. *Thyridota* Uvarov, 1925
108. *Tinaria* Stål, 1861
109. *Truxalis* Fabricius, 1775
110. *Truxaloides* Dirsh, 1950
111. *Xenotruxalis* Dirsh, 1950
112. *Xerohippus* Uvarov, 1942
113. *Yendia* Ramme, 1929
114. *Zapata* Brunner, 1902

EXPLANATION OF SYMBOLS USED IN THE FIGURES OF THE PHALLIC COMPLEX

Ap, apical valves of penis.
Apd, apodemes.
Art, articulation.
Bf, basal fold.
Bp, basal valves of penis.
Cng, cingulum.
Cv, valves of cingulum.
Da, dorsal appendices of penis.
Ect, ectophallus.
Ectm, ectophallic membrane.
Ectv, ectophallic valves.
Ejd, ejaculatory duct.
Ejs, ejaculatory sac.
End, endophallus.
Eph, epiphallus.
Fx, flexure.
Gpr, gonopore processes.
Gprs, gonopore sclerite.
m, membrane.
Op, opening.
Os, oval sclerites.
P, penis.
Pht, phallotreme.
Po, pouch of phallus.
Rm, ramus of cingulum.
Scl, sclerites of indefinite meaning.
Sh, sheath of penis,
Sps, spermatophore sac.
Va, ventral appendices of penis.
Zyg, zygoma.

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BRITISH MUSEUM 20 JUL 1961 NATURAL HISTORY

A.
O.

SUR LES PSELAPHIDES DE CEYLAN

RENÉ JEANNEL

BRITISH MUSEUM
20 JUL 1961
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SUR LES PSELAPHIDES DE CEYLAN

Par LE DR. RENÉ JEANNEL

EN 1892, Eugène Simon fit un séjour à Ceylan et rapporta, entre autres insectes, une série de Psélaphides à laquelle A. Raffray a consacré un mémoire paru dans les *Annales de la Société Entomologique de France* en 1894, mémoire d'ailleurs suivi d'un autre dans les mêmes *Annales*, en 1901, où sont décrites quelques autres espèces cinghalaises recueillies par W. Horn.

Tout récemment, le professeur P. Rémy, de Nancy, m'a remis une quinzaine de Psélaphides pris par lui à Ceylan au cours de ses recherches d'endogés.[1] L'intérêt particulier de ces quelques espèces m'a déterminé à réviser l'ensemble de nos connaissances sur les Psélaphides de Ceylan, en mettant en oeuvre les nombreux matériaux existant au British Museum, la plupart récoltés par G. Lewis, et que M. E. B. Britton m'a aimablement communiqués.

Comme on va le voir, il ressort de cette étude que la faune des Psélaphides de Ceylan est essentiellement malaise, bien différente de celle de l'Inde. Les endémiques y sont très nombreux et on remarquera en particulier l'extrême diversité des genres de la tribu des Batrisini.

Subfam. FARONITAE Jeannel

Les deux tribus des Octomicrini et Pyxidicerini sont largement répandues dans l'archipel Malais, l'Indochine, le Siam et la Birmanie, mais on n'en connait encore aucune espèce de la péninsule Indienne. Les espèces de Ceylan relèvent donc d'une faune malaise.

Trib. OCTOMICRINI Jeannel

Gen. *OCTOMICRUS* L.W. Schaufuss

Octomicrus Schaufuss, 1877, *Psel. Siams* : 14 ; type : *longulus* Schaufuss. Jeannel, 1956, *Rev. fr. d'Ent.* **23** : 86. *Singhala* Raffray, 1898, *Rev. d'Ent. Caen,* **17** : 255 ; type : *punctipennis* Raffray. *Diastictulus* Raffray, nom. nov., 1903, *Ann. Soc. ent. Fr.* **72** : 528.

1. *Octomicrus punctipennis* Raffray, 1894

Raffray, *Ann. Soc. ent. Fr.* **62** : 445 (*Octomicrus*) ; type : Nuwara Eliya (Mus. Paris).

CEYLAN. Nuwara Eliya, alt. 2,200 m. env., une femelle (*E. Simon*).

Cet exemplaire unique a malheureusement été détruit par accident, alors que j'en examinais les caractères.

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[1] *Revue française d'Entomologie*, **27** : 16–21 (1960).

Long, 1, 4 mm. Raffray avait tout d'abord placé cette espèce dans le genre *Octomicrus* Schauf. et a voulu créer un genre nouveau à cause de la ponctuation des élytres. En réalité tous les caractères de l'espèce *punctipennis* sont les mêmes que ceux des espèces malaises du genre *Octomicrus* s. str. Le corps est peu convexe, parallèle, le vertex présente le sillon médian longitudinal caractéristique du genre *Octomicrus*.

Trib. PYXIDICERINI Raffray

Subtrib. PYXIDICERINA Jeannel

Gen. ***PYXIDICERUS*** Motschoulsky

Pyxidicerus Motschoulsky, 1863, *Bull. Nat. Moscou* **36** : 422 ; type : *castaneus* Motschoulsky.

Une dizaine d'espèces connues dans la région malaise et la Nouvelle-Guinée.

1. ***Pyxidicerus castaneus*** Motschoulsky, 1863

(fig. 1)

Motschoulsky, loc. cit. : 423 ; type : Ceylan.

CEYLAN. Hatton, hameau de Threher, alt. 1,500 m. env., un mâle (*P. Rémy*, 27.viii.59).

Long. 1,6 mm. Aptère. Allongé, épais et un peu convexe. Brun rougeâtre, la pubescence assez dense. Tête volumineuse aussi large que le pronotum, ponctuée, le lobe frontal plus long que large, les yeux plus longs que les côtés des tempes. Lobe externe de la massette en forme de gros bouton presque hémisphérique. Antennes de 11 articles, les articles du funicule larges et transverses, la massue de deux articles bien déliés. Pronotum un peu transverse, à côtés arrondis en avant, rétrécis et sinués en arrière, le disque aplani, fortement ponctué, les points non confluents, sans fossette médiane. Elytres quadrangulaires, nettement plus longs que larges, assez densement ponctués, deux fossettes basales. Abdomen large et peu convexe, subparallèle, les trois premiers tergites subégaux, leur bord basal déprimé. Pattes courtes.

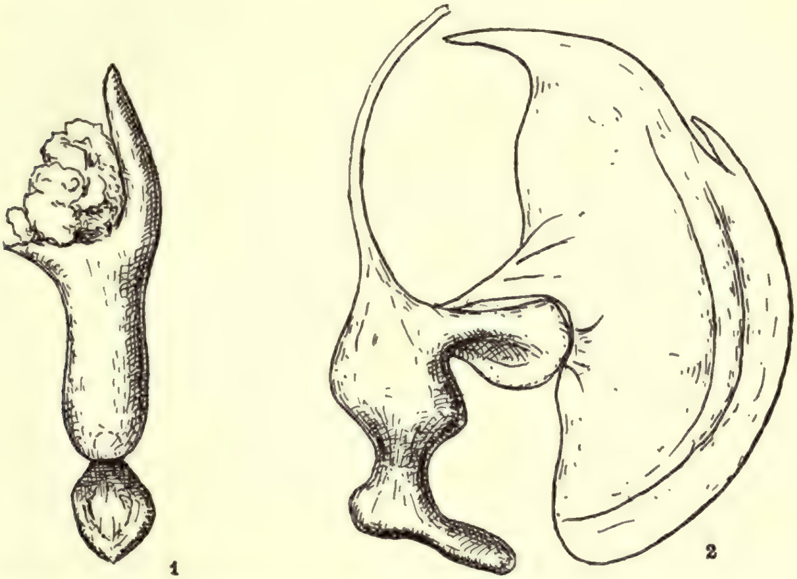
Edéage (fig. 1) simple, non déversé au repos, constitué par une tubulure avec un pavillon basal bien séparé et une large ouverture distale, remplie par le sac interne évaginé et dépassée par une forte apophyse gauche, épaisse et obtuse.

En apparence voisin du *P. rajah* Schauf., de Sumatra. Même aspect général, même ponctuation forte et dense. Mais le *castaneus* est plus allongé, un peu plus grand, sans trace de fossette discale sur le pronotum et avec les élytres plus longs que larges. Chez le *rajah*, il existe une petite fossette discale sur le pronotum et les élytres ne sont pas plus longs que larges. D'autre part, l'édéage du *rajah* (fig. 3) est très différent de celui du *castaneus* ; l'orifice distal est porté sur une tubulure flagelliforme et il existe une expansion latérale du bord gauche qui rappelle plutôt l'extraordinaire édéage de l'espèce suivante.

2. ***Pyxidicerus remyi*** sp. n.
(fig. 2)

Type : Hatton (Mus. Paris).

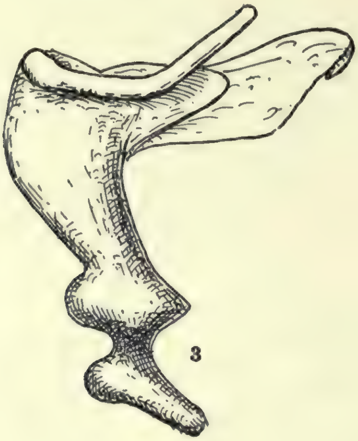
Ceylan. Hatton, hameau de Tepitortem, alt. 1,500 m. env., un mâle (*P. Rémy*, 26.viii.59). Jardin botanique de Peradeniya, alt. 500 m. env., une femelle (*P. Rémy*, 13.viii.59).



Figs. 1 et 2. Gen. *Pyxidicerus* Motsch., édéages. Fig. 1. *P. castaneus* Motsch., de Hatton (×240). Fig. 2. *P. remyi* n. sp., de Hatton, ×360.

Long. 1,6 à 1,8 mm. Aptère. Testacé rougeâtre, la pubescence assez dense. Même forme générale épaisse et peu convexe. Tête petite, plus étroite que le pronotum, ponctuée, le lobe frontal plus long que large, les yeux plus longs que les côtés des tempes. Même structure des palpes. Antennes semblables quoique plus courtes, le pédicelle plus globuleux. Pronotum de même forme que celui du *castaneus* mais plus petit, à ponctuation bien moins serrée et avec une large fossette médiane dont le fond est canaliculé. Elytres courts, moins longs que larges, à ponctuation assez dense mais superficielle, deux fossettes basales. Abdomen large et peu convexe chez le mâle, plus convexe chez la femelle, les trois premiers tergites subégaux, à bord basal déprimé. Pattes courtes.

Edéage (fig. 2). Déversé au repos, avec une extraordinaire expansion semilunaire implantée sur son côté gauche. L'édéage est formé par une dilatation ampullaire portée sur un pavillon basal et effilé du côté distal en un long flagelle creux renfermant la terminaison du sac interne. Le côté gauche de l'ampoule présente une forte apophyse perpendiculaire qui porte une vaste lame chitineuse semilunaire dont le bord convexe épaissi présente deux dents dans sa partie distale. On retrouve sur l'édéage du *P. rajah* (fig. 3) le flagelle tubuleux distal qui est ici rabattu transversalement sur l'édéage au lieu d'être dirigé dans l'axe, et une expansion chitineuse du bord gauche qui correspond sans doute à la formation semilunaire hypertélique du *P. remyi*.



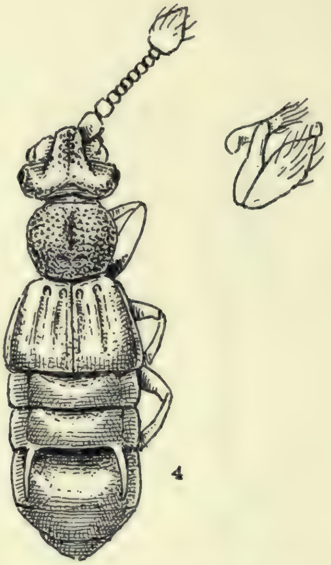


Fig. 3. Gen. *Pyxidicerus* Motsch., édéage (×360) du *P. rajah* Schauf. de Sumatra.

Fig. 4. Gen. *Echinozethus* Jeann., *E. furcifer* Raffr., femelle de Nuwara Eliya, ×42, et palpe maxillaire droit, très grossi.

Subtrib. ZETHOPSINA Jeannel

Gen. *ECHINOZETHUS* Jeannel

Echinozethus Jeannel, 1954, *Mém. Mus., Zool.* **8** : 76 ; type : *Zethopsus furcifer* Raffray.

1. ***Echinozethus furcifer*** (Raffray, 1894)

Raffray, *Ann. Soc. ent. Fr.* **62** : 444 (*Zethopsus*) ; type : Nuwara Eliya (Mus. Paris). Jeannel, 1954, loc. cit. : 77, figs. 24 et 25.

Ceylan. Nuwara Eliya, alt. 2,200 m. env., une femelle (*E. Simon*).

Gen. *ZETHOPSUS* Reitter

Zethopsus Reitter, 1880 ; type : *opacus* Schaufuss. Jeannel, 1954, *Mém. Mus., Zool.* **8** : 69.

1. ***Zethopsus opacus*** Schaufuss, 1877

Schaufuss, *Psel. Siams* : 12 ; loc. cit. : 71, figs. 9 à 11. *sculptiformis* Reitter, 1883 ; type : Batavia (Mus. Paris).

Ceylan. Hikkaduwa, colline de Wewala, à basse altitude, une femelle (*P. Rémy*, 9.ix.1959).

Gen. ***EUPLECTOMORPHUS*** Motschoulsky

Euplectomorphus Motschoulsky, 1863, *Bull. Nat. Moscou*, **36** : 424 ; type : *Euplectomorphus pygmaeus* Motschoulsky. *Zethinellus* Jeannel, 1950, *Ann. Mus. Congo Belge*, série in-8°, *Zool.* **2** : 31 ; type : *Zethopsus nitidulus* Reitter.

Il est bien certain que l'*Euplectomorphus pygmaeus* de Motschoulsky est l'espèce *nitidulus* Reitt., pour laquelle j'ai créé le genre *Zethinellus*. L'espèce est de petite taille (0.8 mm.), aptère, avec des antennes de 8 articles et des palpes maxillaires de même structure que ceux des *Zethopsus* (Jeannel, 1954, Mém. Mus., Zool. 8 : 71, fig. 10). Mais l'édéague (fig. 5) est bien moins complexe que celui des *Zethopsus*.

1. ***Euplectomorphus pygmaeus*** Motschoulsky, 1861

Motschoulsky, *Bull. Nat. Moscou*, **24**, pl. IX, fig. 17. 1863, loc. cit. : 424 ; type : Ceylan. *nitidulus* Reitter, 1882, *Verh. zool.-bot. Ges. Wien*, **32** : 382 (*Zethopsus*) ; type : Ceylan (Mus. Paris). *testis* Schaufuss, 1896, *Tijdschr. Ent.* **29** : 281 (*Euplectomorphus*) ; type : Ceylan (Mus. Paris).

Ceylan. Deniyaya, près du Rest house, alt. 1,500 m. env., une femelle (*P. Rémy*, 5.ix.59).

Subfam. Euplectitae Jeannel

Trib. EUPLECTINI Raffray

Une seule espèce de cette tribu, pourtant partout si nombreuse, est connue de Ceylan. Il est surprenant que P. Rémy n'en ait pas trouvé d'autres.

Gen. ***EUPLECTUS*** Leach

Euplectus Leach, 1817 ; type : *nanus* Reichenbach. Jeannel, 1958, *Mém. Mus., Zool.* **18** : 9 (Subgen. *Archeuplectus* Jeann.).

Le sous-genre *Archeuplectus* Jeann. (type : *annamita* Raffr.), à la vérité assez mal caractérisé, est formé de quelques espèces habitant la région Orientale. L'espèce suivante paraît bien se rapprocher de l'*annamita* Jeann. et du *sarawakensis* Besuchet (1956, *Entomologist*, **59** : 88), mais elle ne présente pas le caractère invoqué pour définir le sous-genre, c'est-à-dire l'insertion de la pièce copulatrice hors de la capsule basale.

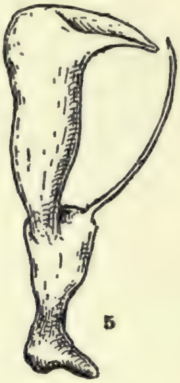
1. *Euplectus (Archeuplectus) remyi* sp. n.

(fig. 6)

Type : Naturawela (Mus. Paris).

CEYLAN. Naturawela, à Nape, région de Korgoda, à basse altitude, un mâle (*P. Rémy*, 14.ix.59).

Long. 1 mm. Aptère. Testacé rougeâtre luisant, la pubescence rare. Tête volumineuse, plus large que le pronotum, le lobe frontal assez grand et saillant, presque aussi long que la partie postoculaire du front, plus large que la moitié du front entre les yeux, son bord antérieur transverse, les bourrelets latéraux saillants, presque sans échancrure externe, les sillons frontaux parallèles. Yeux petits, bien plus courts que les côtés des tempes, celles-ci bombées ; bord occipital avec une profonde échancrure. Antennes courtes, le scape et le pédicelle pas plus longs que larges, les articles du funicule un peu transverses, le 9 et le 10 très transverses, le 10 deux fois aussi large que long, le 11 obtus, deux fois aussi long que large et aussi large que le 10. Pronotum un peu transverse et très rétréci à la base, les côtés arrondis, sans sinuosité postérieure ni échancrure, les angles postérieurs tout à fait effacés ; disque avec une large dépression médiane au fond de laquelle se trouve un sillon longitudinal. Elytres plus longs que larges, déprimés, à épaules éffacées, trois fossettes basales. Abdomen avec les deux premiers tergites déprimés à la base entre les carénules qui sont distantes l'une de l'autre du tiers de la largeur du disque du tergite. Pattes courtes.



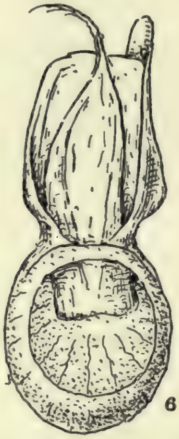


FIG. 5. Gen. *Euplectomorphus* Motsch., édéage de l'*E. pygmaeus* Motsch. de Deniyaya, × 360.

FIG. 6. Gen. *Euplectus* Leach, édéage de l'*E.* (*Archeuplectus*) *remyi* n. sp., de Naturawela, × 360.

Edéage (fig. 6) de même type que celui de l'*annamita* Raffr. (*vide* Jeannel, 1958, *Mem. Mus., Zool.* **18** : 10, fig. 8) en ce sens qu'il est aussi petit, avec une capsule basale sphérique, les pièces distales non divisées et à peine étranglées à la base. Le sac interne est sclérifié à partir de l'intérieur de la capsule et se termine par un mince tube effilé. Pas de soies.

Subfam. BATRISITAE Jeannel

Trib. BATRISINI Raffray

Les genres africains des Batrisini ont été repartis dans cinq divisions principales (Ann. Mus. Congo Belge, sér. in-8, Zool., 75 : 272). Seulement trois de ces divisions se retrouvent dans la faune de la région Orientale.

TABLEAU DES GENRES

1. Elytres à trois fossettes basales ; côtés du pronotum avec des sillons latéraux Division II
–. Elytres à deux fossettes basales ; côtés du pronotum avec des sillons latéraux . 2
2. Yeux situés sur les côtés du front, les tempes plus ou moins développées. Edéage sans pièce articulée . . . . Division IV
–. Yeux situés à la base de la tête, les tempes effacées. Edéage de type " arthromélien " Division V

Division II

1. Espèces robustes, larges, à caractères sexuels mâles portant sur la massue antennaire et les pattes. Edéage à sac interne membraneux . . Gen. ***Tribasodema*** nov.
–. Espèces grêles, allongées, à caractères sexuels mâles portant sur les antennes. Edéage à sac interne sclérifié . . . . Gen. ***Nesiotomina*** nov.

Division IV

1. Abdomen avec les trois premiers tergites munis de carénules externes. Massette palpaire des mâles renflée à la base. Tête trapézoïdale, pronotum à côtés brusquement échancrés, élytres très étroits à la base . . . Gen. ***Batrisomalus*** Raffr.
–. Abdomen avec le premier tergite seul muni de carénules externes 2
2. Premier tergite abdominal caréné latéralement à la base seulement. Pronotum à peine sillonné, avec deux carénules discales. Palpes simples . Gen. ***Cratnodes*** nov.
–. Premier tergite abdominal caréné latéralement sur toute sa longueur. Pronotum sillonné sur la ligne médiane, sans carénules discales. Massette palpaire renflée et dentée chez les mâles . . . . Gen. ***Batribolbus*** Raffr.

Division V

1. Caractères sexuels des mâles portant sur le premier tergite abdominal Gen. ***Batrisiella*** Raffr.

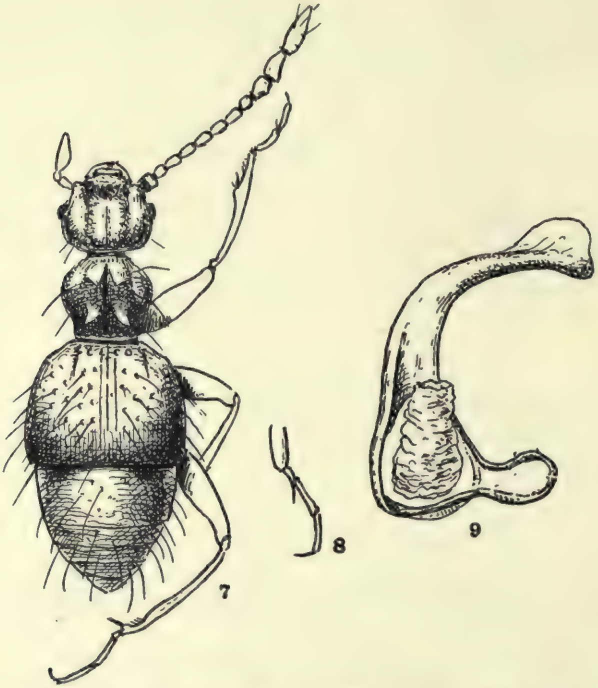
Gen. ***TRIBASODEMA*** nov.

Type : *Batrisus armatus* Raffray.

Genre créé pour une espèce de forme robuste, à pubescence formée de soies très longues et hérissées. Tête arrondie, les yeux petits, situés sur les côtés, en avant de longues tempes convexes. Massette palpaire fusiforme non pédonculée, antennes à scape court. Pronotum sans denticule latéral, le disque trisillonné, avec deux paires de grosses dents. Elytres amples, à épaules effacées, avec trois fossettes basales et une strie discale très courte. Premier tergite abdominal seul caréné latéralement, les parties latérales du disque déprimées. Pattes longues et robustes.

Caractères sexuels mâles portant sur la massue antennaire et les pattes.

Edéage (fig. 9) constitué par un collier basal très asymétrique, prolongé par une grande lame distale. Sac interne membraneux.



FIGS. 7–9. Gen. *Tribasodema* nov. Fig. 7. *T. armatum* Raffr., mâle, de Nuwara Eliya, ×22. Fig. 8. Tarse intermédiaire droit du mâle. Fig. 9. Edéage, face dorsale, ×110.

1. ***Tribasodema armatum*** (Raffray, 1894)

(figs. 7 à 9)

Raffray, *Ann. Soc. ent. Fr.* **62** : 447 (*Batrisus*) ; type : Nuwara Eliya (Mus. Paris).

CEYLAN. Nuwara Eliya, alt. 2,200 m. env., 2 mâles et 2 femelles (*E. Simon*, 1892).

Long. 2,2 et 2,4 mm. Rougeâtre foncé, luisant, la pubescence constituée par de grandes soies dressées. Tête large, arrondie et déprimée, avec deux profonds sillons longitudinaux encadrant le vertex ; yeux petits, bien plus courts que les tempes. Antennes longues et grêles. Pronotum court, profondément sillonné sur la ligne médiane et déprimé en dehors des épines discales. Elytres très larges, courts et convexes, éparsement ponctués. L'abdomen atténué, le premier tergite très grand. Pattes robustes.

Mâle. Article 10 des antennes élargi et denté à la base, le 11 un peu asymétrique, tronqué à la base. Tibia antérieur avec une dent au tiers distal du bord interne, puis cilié jusqu'au sommet, la face dorsale du tibia déprimée et excavée au niveau de la dent ; premier article du tarse intermédiaire (fig. 8) avec une épine ventrale ; sommet du tibia postérieur aplati et incurvé sur sa face interne, puis armé d'un grand éperon.

Edéage (fig. 9) à collier basal muni d'un profond diverticule de son bord gauche ; la lame distale épaisse, fortement incurvée à gauche et terminée par une palette.

Gen. ***NESIOTOMINA*** nov.

Type : *Batrisus spinicollis* Motschoulsky.

Espèces grêles et allongées, à pubescence formée de longues soies dressées. Tête allongée, les yeux petits, placés sur les côtés, en avant de tempes convexes. Massette palpaire fusiforme non pédonculée à la base. Antennes à scape court. Pronotum allongé, sans denticule latéral, le disque profondément sillonné, avec deux paires de fortes épines. Elytres à trois fossettes basales, sans strie discale ni strie suturale, la surface couverte de gros points. Premier tergite abdominal caréné latéralement, avec une carénule externe parallèle au bord. Pattes très longues.

Caractères sexuels mâles portant sur la massue antennaire.

Edéage (fig. 11) constitué par un collier basal avec une longue apophyse du bord gauche. Sac interne soutenu par une baguette chitineuse aussi longue que l'apophyse.

1. ***Nesiotomina spinicollis*** (Motschoulsky, 1858)

(figs. 10 et 11)

Motschoulsky, *Et. ent.* **7** : 27 (*Batrisus*) ; type : Ceylan. Raffray, 1893, *Ann. Soc. ent. Fr.* **62** : 446 (*Batrisus*).

CEYLAN. Nuwara Eliya, alt. 2,200 m. env., un mâle et 2 femelles (*E. Simon*, 1892).

Long. 1,7 mm. Rougeâtre luisant, la pubescence constituée par de grandes soies dressées. Tête subcarrée, très déprimée, les yeux petits, les tempes longues et convexes. Antennes peu longues, le funicule épais, les articles 6 et 8 courts, la massue très épaisse aussi longue que le funicule. Le pronotum presque aussi long que large, profondément sillonné sur la ligne médiane, déprimé en dehors des épines discales. Elytres très bombés, à épaules effacées, couverts de gros points peu serrés. Premier tergite abdominal très grand. Pattes longues, les fémurs brusquement amincis dans le quart distal.

Mâle. Derniers articles des antennes asymétriques, le 10 bossu en dedans, le 11 denté en dedans à la base.

Edéage (fig. 11) à collier basal large et apophyse du bord gauche fortement incurvée en dedans, large et anguleuse à la base, progressivement atténuée au sommet.

2. *Nesiotomina longicollis* sp. n.

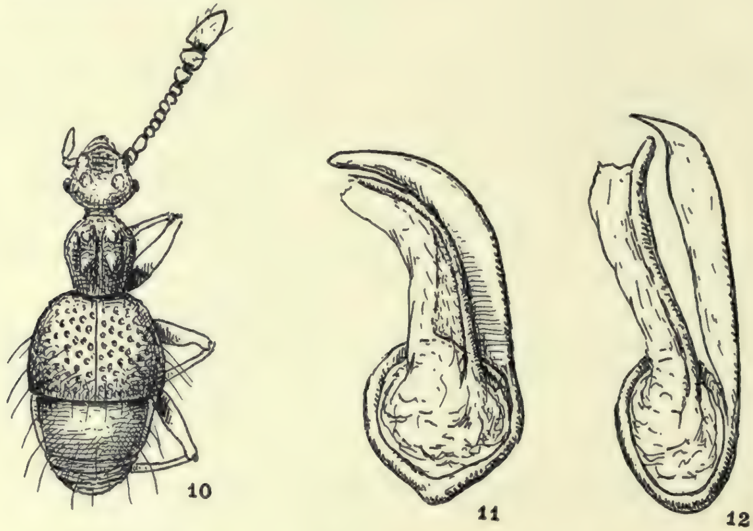
(Fig. 12)

Type : Hatton (Mus. Paris).

CEYLAN. Hatton, au pied d'une haie le long de la voie ferrée, alt. 1,400 m. env., 1 mâle (*P. Rémy*, 27.viii.59).

Long. 1,8 mm. Voisin du précédent, mais plus allongé, avec les antennes plus fines et plus longues, les articles du funicule plus longs que larges, la massue moins épaisse, nettement plus courte que le funicule. Pronotum plus long que large. Elytres moins renflés.

Mêmes caractères sexuels.



FIGS. 10–12. Gen. *Nesiotomina* nov. Fig. 10. *N. spinicollis* Raffr., mâle, de Nuwara Eliya, ×22. Fig. 11. Edéage, face dorsale, ×110. Fig. 12. Edéage du *N. longicollis* n. sp., de Hatton, ×110.

Edéage (fig. 12) à collier basal plus étroit et apophyse du bord gauche non incurvée en dedans, étroite à la base, brusquement terminée par un crochet à l'extrémité. Même structure du sac interne.

Gen. *BATRISOMALUS* Raffray

Batrisomalus Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 12 et 60 ; type : *Batrisus microphthalmus* Raffray.

Déprimés, la tête trapézoïde, rétrécie en avant, à lobe frontal peu saillant, yeux petits, formés d'un petit nombre d'ommatidies, les tempes anguleuses. Massette palpaire élargie à la base, acuminée au sommet. Pronotum cordiforme, à bosses latérales très saillantes, brusquement tronquées en arrière, la base très étroite. Disque avec trois sillons longitudinaux très profonds et deux carénules. Elytres courts, très rétrécis à la base, deux fossettes basales. Abdomen avec les trois premiers tergites rebordés, munis de carénules externes obliques et entières, le premier tergite très grand. Hanches postérieures très écartées, l'apophyse intercoxale du métasternum tronquée. Pattes courtes, robustes.

Raffray à placé dans ce genre quatre espèces, dont trois de Ceylan et une de l'Inde méridionale, mais cette dernière ayant trois fossettes basales aux élytres doit se placer dans un autre genre.

Tableau des Espèces

1. Allongé, peu déprimé. Tête avec des sillons frontaux étendus sur tout le front, le vertex triangulaire et caréné sur la ligne médiane. Pronotum un peu plus large que la tête. Elytres moins atténués en avant, à ponctuation éparse et superficielle. Long, 2,3 mm. . . . . 1. ***microphthalmus*** (Raffray)

–. Très déprimé, le pronotum bien plus large que la tête. Elytres très atténués en avant, à ponctuation forte et éparse 2

2. Tête trapézoïde, à sillons frontaux obliques et convergeants en avant, le vertex large, transversalement caréné entre les yeux. Long. 1,6 mm. . 2. ***depressus*** (Raffray)

–. Tête plus rétrécie en avant, ses côtés plus explanés, les sillons frontaux parallèles dans leur partie postérieure, le vertex étroit. Elytres proportionnellement plus courts. Long. 1,6 mm. . . . . 3. ***hemipterus*** (Raffray)

1. *Batrisomalus microphthalmus* (Raffray, 1894)

Raffray, *Ann. Soc. ent. Fr.* **62** : 448 (*Batrisus*) ; type Nuwara Eliya.

Ceylan. Nuwara, Eliya, alt. 2,200 m. env., 2 femelles (*E. Simon*, 1892).

2. *Batrisomalus depressus* (Raffray, 1894)

Raffray, *Ann. Soc. ent. Fr.* **62** : 448 (*Batrisus*) ; type : Hakgala.

Ceylan. Hakgala, une femelle (*E. Simon*, 1892).

3. *Batrisomalus hemipterus* (Raffray, 1894)

Raffray, *Ann. Soc. ent. Fr.* **62** : 449 (*Batrisus*) ; type : Nuwara Eliya. 1904, *Ann. Soc. ent. Fr.* **73** : 60, fig. 44.

Ceylan. Nuwara Eliya, alt. 2,200 m. env., 2 mâles et 2 femelles (*E. Simon*, 1892).

Gen. *CRATNODES* nov.

Type : *Cratnodes lewisi* n. sp.

Robuste, coloration foncée, la pubescence couchée. Tête arrondie, les yeux petits situés sur les côtés du front, les tempes convexes. Pronotum triangulaire, rétréci à la base, sans denticule sur les bosses latérales, le disque à peine sillonné sur la ligne médiane avec deux carénules longitudinales. Elytres à deux fossettes basales. Premier tergite abdominal caréné latéralement dans sa partie antérieure, les carénules externes du disque courtes. Hanches postérieures très écartées, l'apophyse intercoxale du métasternum tronquée.

Pas de caractères sexuels apparents.

Edéage (fig. 14) constitué par un bulbe basal prolongé par une gaine dorsale infléchie, qui renferme le sac interne. Du côté ventral se trouve une pièce lamelleuse articulée par sa base au bord du bulbe basal et atténuée en longue pointe.

1. *Cratnodes lewisi* n. sp.

(figs. 13 et 14)

Type : Kandy (Brit. Mus.).

Ceylan. Kandy, alt. 600 m., un mâle (*G. Lewis*) ; Bogawantalawa, alt. 1,800 m. env., un mâle (*G. Lewis*).

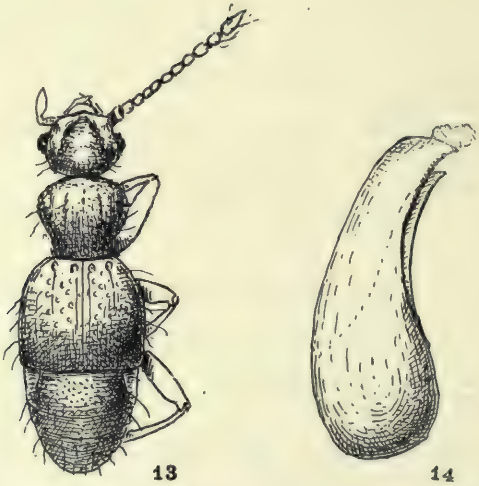


Fig. 13 et 14. Gen. *Cratnodes* nov. Fig. 13. *C. lewisi* n. sp., mâle de Bogawantalawa, × 23. Fig. 14. Edéage, × 110.

Long. 1,9 mm. sans doute ailé. Brun rougeâtre foncé, les élytres, les antennes et les pattes rougeâtres, la pubescence dorée, assez longue. Tête médiocre, le front déprimé par deux larges sillons frontaux, le lobe frontal court ; yeux plus courts que les tempes qui sont convexes. Antennes grêles, les articles du funicule plus longs que larges, la massue à peine épaissie. Pronotum aussi long que large, à bosses latérales arrondies et saillantes, le disque régulièrement et peu convexe, la base très étroite ; pas de fovéole basale. Elytres peu convexes, à épaules assez saillantes et carénées, la surface éparsement ponctuée, la strie discale écourtée. Premier tergite abdominal long et densement ponctué. Pattes robustes.

Edéage : fig. 14.

Gen. *BATRIBOLBUS* Raffray

Batribolbus Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 61 ; type : *Eubatrisus dentipes* Raffray.

Les types des trois espèces de ce genre ont été perdus.[1] Parmi les matériaux recueillis par P. Rémy se trouve un mâle du *B. pubescens*, ce qui me permet de constater que l'édéage est d'un type assez particulier, volumineux, très sclérifié, formé d'une capsule basale close, avec des pièces distales non articulées (fig. 15).

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[1] Les dix derniers des genres de Batrisini énumérés dans le *Catalogus Junk* manquent dans la collection Raffray. Ils ont été perdus lors du déménagement de cette précieuse collection de Rome à Paris.

Tableau des Espèces

Femelles

1. Lobe frontal haut et large, aussi large en avant qu'au niveau des yeux. Pubescence longue et dense, doublée par de très longues soies dressées sur les tergites abdominaux. Long. 1,6 à 1,8 mm. . . . . 1. **dentipes** (Raffray)
–. Lobe frontal court et bas, rétréci en avant. Pubescence simple, sans longues soies dressées 2
2. Pronotum transverse, à bosses latérales très saillantes. Pygidium de la femelle avec une corne sagittale. Pubescence très dense. Long. 1,5 à 1,6 mm. 2. **pubescens** (Raffray)
–. Pronotum étroit, à bosses latérales peu saillantes. Pygidium inerme. Plus allongé, la pubescence moins dense. Long. 1,4 à 1,5 mm. . . . 3. **palpator** (Raffray)

1. **Batribolbus dentipes** (Raffray, 1894)

Raffray, *Ann. Soc. ent. Fr.* **62** : 450 (*Eubatrisus*) ; type : Nuwara Eliya.

Ceylan. Nuwara Eliya, alt. 2,200 m. env. (*E. Simon*, 1892). Hakgala, dans le jardin botanique, alt. 1,500 m. env., une femelle (*P. Rémy*, 23.viii.59) ; Dikoya, alt. 800 m. env., 2 femelles (*G. Lewis*) ; Bogawantalawa, alt. 1,800 m. env. (*G. Lewis*).

2. **Batribolbus pubescens** (Raffray, 1894)

(fig. 15)

Raffray, *Ann. Soc. ent. Fr.* **62** : 451 (*Eubatrisus*) ; type : Kandy.

Ceylan. Hatton, au pied d'une haie le long de la voie ferrée, alt. 1,400 m. env., 3 femelles (*P. Rémy*, 27.viii.1959) ; Kandy alt. 600 m. mâles et femelles (*E. Simon*, 1892).

Edéage (fig. 15) volumineux, très sclérifié, constitué par une capsule basale arrondie, avec vaste orifice basal ventral, prolongée par une gaine distale, large et courte, dont l'orifice apical s'ouvre entre quatre apophyses inégales : une ventrale, comprimée en lame de couteau, deux latérales plus petites, une dorsale très longue et incurvée, lobée à l'extrémité, cette dernière apophyse paraissant formée par une sclérification partielle du sac interne.

Batribolbus palpator (Raffray, 1894)

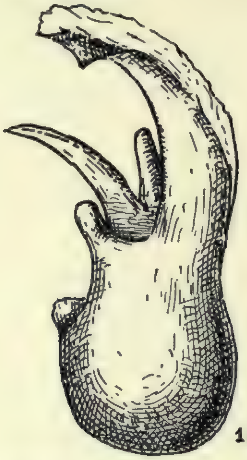
Raffray, *Ann. Soc. ent. Fr.* **62** : 451 (*Eubatrisus*) ; type : Wakwele.

Ceylan. Nuwara Eliya, ravin dans Elephant estate, alt. 2,100 m., une femelle (*P. Rémy*, 21.viii.59) ; Kandy, alt. 600 m. (*G. Lewis*) ; Wakwele, mâle et femelle (*E. Simon*).

Gen. ***BATRISIELLA*** Raffray

Batrisiella Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 11 et 59 ; type : *Eubatrisus caviventris* Raffray. *Arthromelinus* Jeannel, 1952. *Rev. fr. d'Ent.* **19** : 98 ; type : *Batrisus* (*Batrisodes*) *angulatus* Raffray (1892) (Sumatra).

Il ne me paraît pas douteux qu'il n'existe aucune différence générique entre les espèces indo-malaises que j'ai placées dans le genre *Arthromelinus* et le *Batrisiella caviventris* (Raffr.), de Ceylan.



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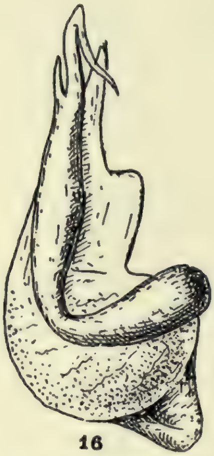

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FIG. 15. Gen. *Batribolbus* Raffr., édéage du *B. pubescens* Raffr., de Hatton, × 110.

FIG. 16. Gen. *Batrisiella* Raffr., édéage du *B. caviventris* Raffr. de Anuradhapura, × 110.

Les types de cette dernière espèce sont perdus, mais les espèces certainement voisines du *caviventris* recueillies à Ceylan par G. Lewis puis par P. Rémy me font constater qu'il n'existe aucune différence dans l'écartement des hanches postérieures permettant de les distinguer des espèces de l'archipel Malais, de l'Indochine ou du Tonkin. C'est donc le nom générique de *Batrisiella* qui doit être attribué à ces dernières.

TABLEAU DES ESPÈCES DE CEYLAN

1. Edéage à capsule basale arrondie et lame distale droite, bien développée (fig. 16) . 2

–. Edéage de forme particulière, en " toupie ", la lame distale très courte, la capsule basale transverse, avec une saillie caudée basale formée par un diverticule de l'orifice basal (figs. 21 et 22) 4

2. Pas de caractères sexuels sur les tergites abdominaux. Court, les antennes et les pattes courtes. Lame distale de l'édéage large, parallèle, à sommet large et multidenté. Long. 1,8 mm. . . . . 1. ***puberula*** sp. n.

–. Premier tergite abdominal des mâles avec une fosse bien développée 3

3. Tête, pronotum et élytres grossièrement ponctués. Abdomen du mâle avec une fosse relativement petite mais profonde sur la partie postérieure du tergite, entre deux grandes aires ponctuées. Edéage (fig. 16) à lame distale longue et ponctuée, mais aussi avec un diverticule caudé de l'orifice basal. Long. 2 mm. 2. ***caviventris*** (Raffray)

–. Téguments lisses. Abdomen du mâle avec une vaste fosse peu profonde, sans bords abrupts, avec une apophyse médiane. Antennes et pattes peu longues. Edéage (fig. 18) à lame distale pointue, sans diverticule caudé à la base. Long. 1,8 mm. 3. ***saucia*** (Raffray)

4. Fosse du tergite du mâle petite, étroite et profonde, à bords abrupts, occupant le milieu du bord postérieur du tergite et divisée en deux loges arrondies par deux apophyses médianes. Antennes courtes. Edéage (fig. 19) à capsule basale difforme. Long. 1,8 mm. . . . . 4. ***singhalensis*** (Raffray)

–. Fosse du tergite du mâle large, ayant l'aspect d'une vaste dépression, sans bords abrupts. Antennes très longues. Edéage (fig. 21) à capsule en toupie très régulière 5

5. Fosse du tergite des mâles occupant toute la longueur du tergite, très peu profonde, encadrée en avant par deux bosses. Lame distale de l'édéage avec une dilatation apicale transverse (fig. 22). Long. 2,2 mm. . . . . . . 5. ***remyi*** sp. n.

–. Fosse du tergite des mâles n'occupant que la moitié postérieure, très profonde et bien limitée ; partie basale du tergite avec deux fossettes arrondies (fig. 20). Lame distale de l'édéage atténuée en pointe (fig. 21). Long. 2,2 mm. . . 6. ***lewisi*** sp. n.

1. *Batrisiella puberula* sp. n.

(fig. 17)

Type : Lunawa (Mus. Paris).

CEYLAN. Lunawa, sur le littoral, un mâle (*P. Rémy*, 16.ix.1959).

Long. 1,8 mm. Ailé. Rougeâtre foncé, les élytres et les pattes plus clairs, la pubescence courte, mais dense. Tête à front subcarré, convexe, large en avant, les yeux très grands, saillants. Massette palpaire elliptique, non renflée chez le mâle. Antennes courtes, les articles du funicule brièvement ovales, les 9 et 10 un peu plus longs que larges, le 11 elliptique. Pronotum à peine plus long que large, les bosses latérales très peu saillantes (mâle). Premier tergite abdominal très grand, un peu moins long que large et légèrement rétréci en arrière, très régulièrement convexe et uni chez le mâle. Pattes courtes.

Edéage (fig. 17) petit, à capsule basale transverse et orifice basal ouvert à la partie ventrale, sans diverticule basal. Lame distale large et parallèle, dirigée perpendiculairement à l'axe transversal de la capsule, son extrémité large et multidentée. Pièce articulée épaisse et régulièrement arquée.

2. *Batrisiella caviventris* (Raffray, 1894)

(fig. 16)

Raffray, *Ann. Soc. ent. Fr.* **62** : 452 (*Eubatrisus*) ; type : Nuwara Eliya.

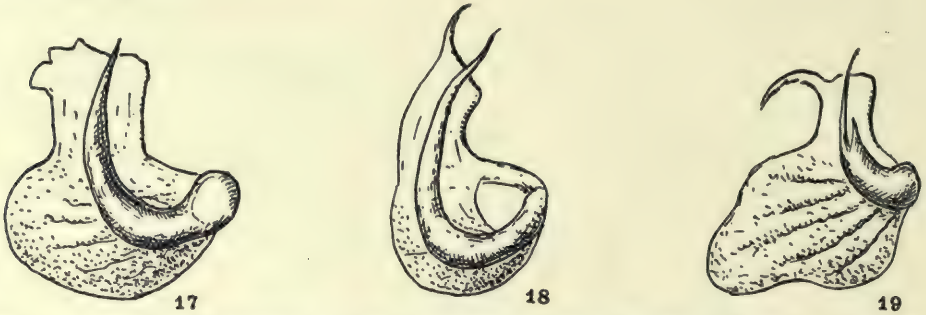
CEYLAN. Nuwara Eliya, alt. 2,200 m. env., mâles et femelles (*E. Simon*, 1892) ; Anuradhapura, un mâle pris à la lumière (*I. W. S. Pringle*, iii.1953).

Les types sont perdus. Je crois cependant pouvoir rapporter à cette espèce un mâle des collections du British Museum.

Long. 2 mm. Ailé. Testacé rougeâtre brillant, à pubescence rare. Tête et disque du pronotum densement et fortement ponctués, les élytres amples à ponctuation éparse et superficielle.

Premier tergite abdominal avec une fosse arrondie sur la partie postérieure du tergite, encadrée par deux larges aires ponctuées.

Edéage (fig. 16) à capsule basale arrondie, non transverse, et lame distale longue, large à la base, amincie et pointue au sommet. Orifice basal avec un diverticule arrondi saillant à la base de la capsule. Pièce articulée caudée, sa partie distale rectiligne, renflée, son orifice distal ouvert entre deux dents dont l'une porte une apophyse rétrograde.



FIGS. 17–19. Gen. *Batrisiella* Raffr., édéages, face dorsale (×110). Fig. 17. *B. puberula* sp. n. de Lunawa. Fig. 18. *B. saucia* Raffr. de Trincomali. Fig. 19. *B. singhalensis* Raffr. de Banderawella.

3. ***Batrisiella saucia*** (Raffray, 1901)

(fig. 18)

Raffray, *Ann. Soc. ent. Fr.* **70** : 27 (*Batrisocenus*) ; type : Trincomali (Mus. Paris).

CEYLAN. Trincomali, un mâle (*W. Horn*).

Long. 1,8 mm. Ailé. Brun rougeâtre foncé, les élytres, les antennes et les pattes rougeâtres. Peu convexe et lisse. Antennes peu longues avec tous les articles un peu plus longs que larges. Pronotum aussi long que large. Elytres amples, à épaules saillantes et disque peu convexe. Pattes courtes.

Premier tergite du mâle avec une vaste dépression peu profonde, sans bords abrupts, dont le fond, en demi-cercle à convexité antérieure, porte un tubercule médian.

Edéage (fig. 18) à capsule arrondie et lame distale longue et pointue comme celle du *caviventris*. Mais il n'existe pas de diverticule caudé à la base de la capsule.

4. ***Batrisiella singhalensis*** (Raffray, 1901)

(fig. 19)

Raffray, *Ann. Soc. ent. Fr.* **70** : 27 (*Batrisocenus*) ; type : Banderawella (Mus. Paris).

CEYLAN. Banderawella, un mâle (*W. Horn*).

Long. 1,8 mm. Ailé. Même coloration. Plus convexe et lisse. Antennes aussi peu longues. Pronotum semblable. Elytres plus convexes, plus étroits en avant. Pattes courtes

Premier tergite du mâle avec une fosse arrondie, petite et profonde à bords abrupts, occupant le milieu du bord postérieur du tergite et divisée en deux loges arrondies par la saillie de deux apophyses s'opposant l'une à l'autre sur la ligne médiane.

Edéage (fig. 19) à capsule basale difforme, la lame distale courte, avec une apophyse droite, la pièce articulée très courte.

5. **Batrisiella remyi** sp. n.

(fig. 22)

Type : Hatton (Mus. Paris).

Ceylan. Hatton, au pied de haies le long de la voie ferrée, alt. 1,400 m. env., un mâle et une femelle (*P. Rémy*, 27.viii.1959) ; Dikoya, alt. 1,400 m. env., un mâle et une femelle (*G. Lewis*, 1882) ; Colombo, niveau de la mer, un mâle (*G. Lewis*, iv.1882).

Long. 2,2 mm. Ailé. Brun rougeâtre foncé et luisant, les pattes rougeâtres. Allongé, lisse. Tête à format subcarré et yeux très grands. Antennes longues et grêles, les articles 2 à 8 env. deux à trois fois aussi longs que larges, les 9 à 11 allongés. Pronotum aussi long que large, à bosses latérales peu saillantes. Elytres amples et convexes, à épaules saillantes et surface lisse et luisante. Pattes peu longues.

Mâle. Premier tergite relativement court, avec une large dépression occupant toute sa longueur entre deux voussures latérales. Au centre de la dépression se dresse une petite carène sagittale.

Femelle. Premier tergite court, deux fois aussi large que long, uni, régulièrement convexe.

Edéage (fig. 23) en toupie régulière, avec un diverticule basal aigu de l'orifice basal. Sommet de la lame distale transversalement dilaté.

6. **Batrisiella lewisi** sp. n.

(figs. 20 et 21)

Type : Colombo (Brit. Mus.).

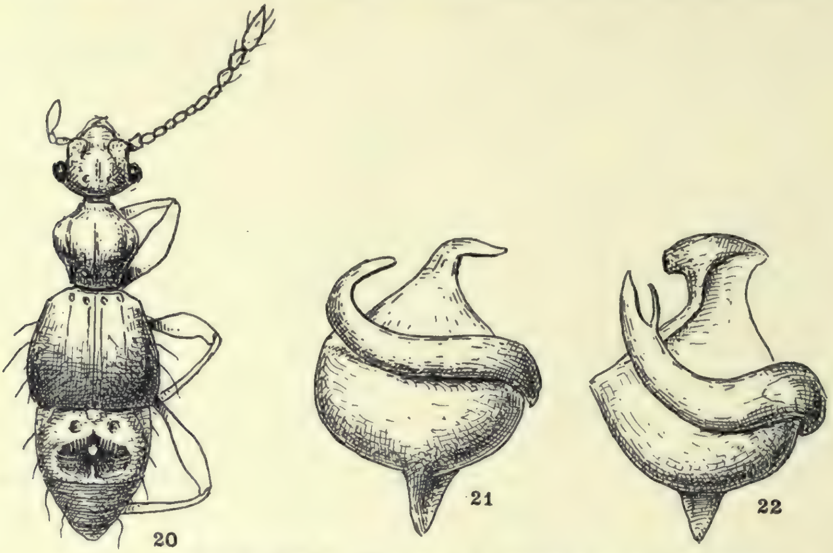
Ceylan. Colombo, au niveau de la mer, un mâle (*G. Lewis*, 27.iv.1882) ; Kandy, alt. 200 m. env., une femelle (*G. Lewis*, 6.iv.1882) ; Bogawantalawa, alt. 1,800 m. env., une femelle (*G. Lewis*, 4.iv.1882).

Long. 2,2 mm. Ailé. Brun rougeâtre foncé luisant, les antennes et les pattes rougeâtres. Allongé, lisse, la pubescence longue et espacée, dressée sur les élytres et l'abdomen, les soies devenant très longues sur celui-ci. Tête comme chez le précédent. Antennes un peu plus longues. Pronotum encore plus rétréci à la base. Elytres semblables.. Pattes longues et robustes.

Mâle. Premier tergite (fig. 20) plus long que chez *remyi*, avec une très profonde fosse transverse et un peu bilobée sur la partie postérieure du tergite. En avant de la fosse, deux fossettes latéralement, la surface du tergite est éparsement ponctuée. Bord antérieur du deuxième tergite déprimé.

Femelle. Premier tergite long, de moitié plus large que long, non rétréci en arrière, la surface unie, convexe, pubescente avec quelques très longues soies.

Edéage (fig. 21) semblable à celui du *remyi*, mais avec la lame distale atténuée en pointe caudée à angle droit et avec l'extrémité de la pièce articulée simple.



Figs. 20–22. Gen. *Batrisiella* Raffr. Fig. 20. *B. lewisi* sp. n. de Colombo, ×24. Fig. 21. Edéage du même, ×110. Fig. 22. Edéage du *B. remyi* sp. n., de Hatton, ×110.

Subfam. Bythinitae Jeannel

Trib. TANYPLEURINI Jeannel

Subtrib. Tanypleurina Jeannel

Gen. ***ACROCOMUS*** Raffray

Acrocomus Raffray, 1894, *Ann. Soc. ent. Fr.* **62** : 460 ; type : *Acrocomus cribratus* Raffray.

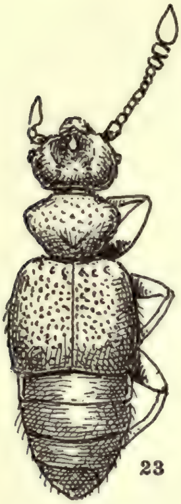
Genre voisin de *Dalmodes* Reitt. dont les nombreuses espèces occupent l'Amérique du Sud, et le *Sunorfa* Raffr. qui réunit deux espèces malaises et une vingtaine d'autres de la Nouvelle-Guinée. Ces trois genres ont trois fossettes basales aux élytres, ce qui les distingue des autres Tanypleurini.

Ces trois genres représentent donc la survivance d'une vieille lignée inabrésienne, datant du Secondaire (*La Genèse des faunes terrestres*, 1942 : 259).

Les caractères essentiels du genre *Acrocomus* sont les suivants : Tête large, arrondie, à petits yeux. Massette palpaire sécuriforme. Antennes à scape court. Pronotum avec une fovéole basale, sans sillon transverse. Elytres à 3 fossettes basales, sans strie suturale ni strie discale. Premier tergite abdominal seul rebordé latéralement ; premier sternite entier, libre, aussi long que le deuxième. Hanches postérieures très écartées.

Edéage à capsule basale close, symétrique, avec une musculature interne ; deux grands styles achètes.

Ce type d'édéage est absolument le même que chez un *Sunorfa nodifera* Raffr., de la Nouvelle-Guinée (fig. 25). Il diffère par contre de celui des *Dalmodes*, dont la capsule basale subsphérique porte deux grands styles symétriques et achètes, très saillants.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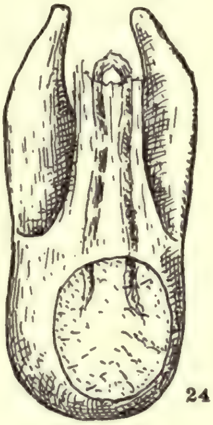
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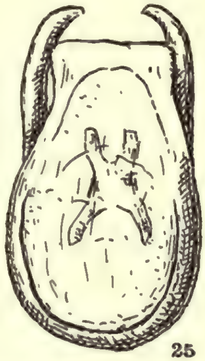
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Figs. 23 et 24. Gen. *Acrocomus* Raffr. Fig. 23. *A. cribratus* Raffr., de Maturata, × 30. Fig. 24. Edéage, face dorsale du même, × 120.
Fig. 25. Gen. *Sunorfa* Raffr., édéage du *S. nodifera* Raffr., de la Nouvelle-Guinée, × 120.

1. ***Acrocomus cribratus*** Raffray, 1894

(figs. 23 et 24)

Raffray, *Ann. Soc. ent. Fr.* **62** : 460 ; type : Maturata (Mus. Paris).

Ceylan. Maturata, un mâle (*E. Simon*, 1892).

Long. 1,8 mm. Aptère, brun rougeâtre, la pubescence assez longue. Ponctuation de la tête et du pronotum peu dense, celle des élytres très serrée ; abdomen sans ponctuation.

Mâle. Le front, largement déprimé en avant, porte une dent médiane saillante au centre de la dépression et deux saillies anguleuses symétriques sur le bord postérieur de celle-ci.

Edéage (fig. 24), robuste, fortement sclérifié. Capsule basale arrondie, avec une fenêtre dorsale, et prolongée par une gaine étroite, rectiligne, contenant le sac interne renforcé par deux bandelettes chitineuses. Elytres très grands, larges, atténués en pointe mousse.

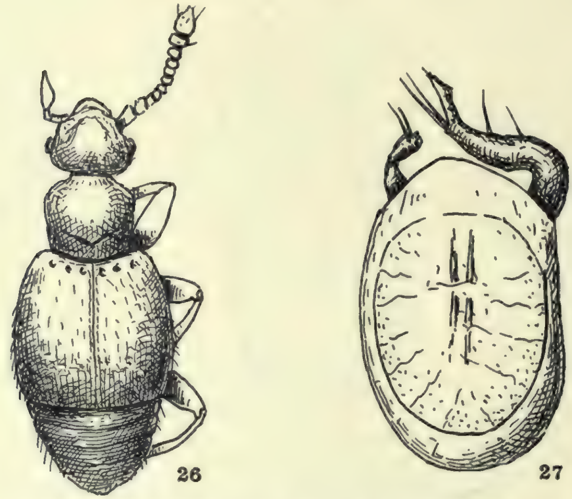
Gen. ***SUNORFA*** Raffray

Sunorfa Raffray, 1882, *Rev. d'Ent.* **1** : 28 ; type : *Sunorfa capitata* Raffray.

Genre renfermant une vingtaine d'espèces, la plupart de la Nouvelle-Guinée ; deux sont connues de Singapore et de Sumatra. Le genre *Sunorfoides* Raffray, avec quelques espèces des Séchelles, semble ne pouvoir guère en être séparé.

1. ***Sunorfa quadraticollis*** sp. n.

(figs. 26 et 27)



Figs. 26 et 27. Gen. *Sunorfa* Raffr. Fig. 26. *S. quadraticollis* n. sp., de Ratnalana, ×36. Fig. 27. Edéage, face dorsale, ×185.

Type : Ratnalana (Mus. Paris).

Ceylan. Ratnalana, près de la côte (*P. Rémy*, 19.ix.1959).

Long. 1,4 mm. Ailé. Testacé rougeâtre, la pubescence courte et dense. Tête médiocre, le lobe frontal court et anguleux, les yeux plus courts que les tempes, le bord occipital du front avec une large fossette. Pattes grêles, à massette sécuriforme. Antennes à articles du funicule un peu transverses, le 10 très transverse, la massue peu renflée. Pronotum aussi long que large et subcarré, la base large, les côtés peu arqués ; disque convexe sans fossette discale, la fovéole basale avec un sillon transverse. Elytres larges, convexes, enveloppants, la gouttière marginale invisible de haut, trois fossettes basales, la strie suturale presque nulle. Abdomen court et atténué, le premier tergite très court, sans carénules basales, mais rebordé latéralement, les autres tergites non rebordés. Pattes courtes, les hanches postérieures très écartées, le premier sternite abdominal court et libre.

Edéage (fig. 27) à capsule basale allongée, deux styles sétifères, très inégaux, le gauche replié en dedans, le droit très court.

Espèce bien différente de toutes les autres par la forme de son pronotum. La structure des styles de l'édéage est bien différente de celle d'un *Sunorfa nodifera* Raffr., de la Nouvelle-Guinée (fig. 25).

Trib. BRACHYGLUTINI Raffray

Gen. *BATRAXIS* Reitter

Batraxis Reitter, 1881, *Verh. zool.-bot. Ges. Wien*, **31** : 464 ; type : *Batraxis hampei* Reitter (Grèce). Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 198.

Genre répandu dans toute la région Indo-Malaise, en Nouvelle-Guinée et même en Australie. Les espèces sont remarquables par la finesse du rebord marginal du premier tergite, lui-même très grand. Beaucoup d'espèces sont glabres.

1. *Batraxis singhalensis* Raffray, 1894

Raffray, *Ann. Soc. ent. Fr.* **62** : 453 ; type : Kandy (Mus. Paris).

Ceylan. Kandy, alt. 600 m. env., une femelle (*E. Simon*, 1892).

Gen. *DIROPTRUS* Motschoulsky

Diroptrus Motschoulsky, 1858, *Et. ent.* **7** : 28 ; type : *Diroptrus ceylonicus* Motschoulsky. Raffray, 1894, *Ann. Soc. ent. Fr.* **62** : 454.

Genre voisin de *Batraxis*, mais différent essentiellement par la longueur de l'article distal des palpes maxillaires, aussi long que la moitié de la massette.

Les trois espèces connues habitent Ceylan.

Tableau des Espèces

1. Tête courte, transverse, le lobe frontal très large en avant, ponctué, surplombant un épistome sans corne médiane chez le mâle. Partie préantennaire de la tête allongée en museau. Pronotum lisse. Long. 1,5 mm. . . 1. **prognathus** sp. n.
–. Tête arrondie, non transverse, le lobe frontal rétréci en avant, l'épistome du mâle avec une petite corne médiane. Partie préantennaire de la tête normale . . . 2
2. Pronotum bossu et éparsement ponctué. Base des antennes du mâle simple. Long. 1,6 mm. . . . . 2. **monoceros** Raffray
–. Pronotum large, modérément convexe et lisse. Scape antennaire du mâle très renflé et difforme. Long. 1,8 mm. . . . . 3. **ceylonicus** Motschoulsky

1. *Diroptrus prognathus* sp. n.

(figs. 28 à 30)

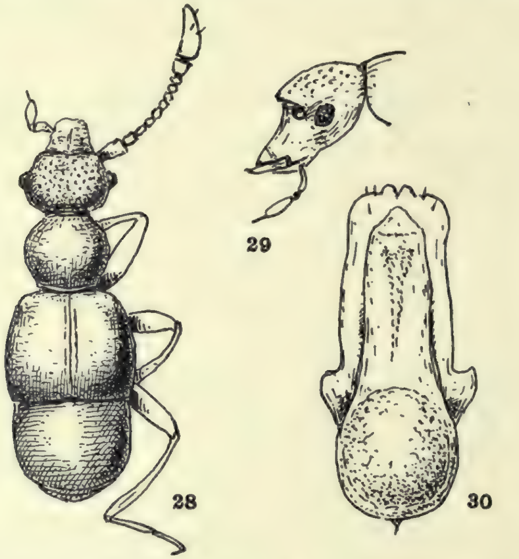
Type : Kandy (Brit. Mus.)

Ceylan. Kandy, alt. 600 m. env., un mâle (*G. E. Bryant*).

Long. 1,5 mm. Aptère. Rougeâtre luisant, glabre. Tête transverse, le front uni et plan, éparsement ponctué, son bord antérieur transverse, un peu échancré au milieu, saillant au dessus de l'épistome ; partie préantennaire allongée en museau (fig. 29), yeux petits. Antennes longues, le scape un peu dilaté au sommet (mâle), les articles 2 à 5 un peu plus longs que larges, les 6 à 9 globuleux, le 10 gros et tronconique, le 11 renflé, asymétrique et allongé. Pronotum aussi long que large, régulièrement convexe et lisse. Elytres un peu plus longs que larges. Premier tergite abdominal très grand, modérément convexe, à côtés subparallèles. Pattes robustes.

Pas de caractères sexuels, si ce n'est, peut-être, une dilatation de la partie distale du scape antennaire.

Edéage (fig. 30), allongé, la capsule basale globuleuse, avec un petit appendice basal, prolongée par une gaine distale longue. Styles larges et soudés, leur base saillante en dehors, leur extrémité distale avec quelques petites soies.



Figs. 28–30. Gen. *Diroptrus* Motsch. Fig. 28. *D. prognathus* n. sp. de Kandy, × 32. Fig. 29. Tête de profil. Fig. 30. Edéage, face dorsale du même, × 120.

2. ***Diroptrus monoceros*** Raffray, 1894

Raffray, *Ann. Soc. ent. Fr.* **62** : 456 ; type : Cottawa (Mus. Paris).

Ceylan. Cottawa, un mâle (*E. Simon*, 1892).

Long. 1,6 mm. Facile à reconnaître à son pronotum bossu et ponctué, à faces latérales du disque impressionées. L'article 10 des antennes est transverse, l'article 11 plus court et plus large que chez l'espèce précédente.

3. ***Diroptrus ceylonicus*** Motschoulsky, 1858

Motschoulsky, *Et. ent.* **7** : 28 ; type : Ceylan. Raffray, 1894, *Ann. Soc. ent. Fr.* **62** : 455.

Ceylan. Maturata, un mâle (*E. Simon*, 1892).

Long. 1,8 mm. Chez le mâle le scape antennaire est très élargi dans sa partie apicale qui forme comme une corolle dont la lèvre ventrale donne insertion au pédicelle. La massue antennaire est comme celle du *monoceros*.

Gen. **EUPINES** King

Eupines King, 1866, *Trans. ent. Soc. N.S. Wales* : 310 ; type : *Bryaxis clavatula* King, 1864. Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 202.

Genre avec de nombreuses espèces en Australie et une espèce dans la région Indo-Malaise.

1. ***Eupines sphaerica*** (Motschoulsky, 1851)

Bryaxis sphaerica Motschoulsky, *Bull. Nat. Moscou,* **24** (2) : 92 ; type : Ceylan. Raffray, 1904, loc. cit : 202.

CEYLAN. Wackwele, 2 mâles (*E. Simon*, 1892).

Connu en outre de Singapore, de Saïgon, de Java et Sumatra, de Célèbes, de Bornéo, de la Nouvelle-Guinée.

Gen. **LEPTORRACHIS** nov.

Type : *Leptorrhachis nigra* sp. n.

Très grêle, l'arrière corps subsphérique, les membres très longs. Tête à front déprimé, les antennes très grêles, les palpes petits, à intermédiaire renflé. Pronotum hexagonal, sans sillon transverse unissant la fovéole basale aux fossettes latérales. Elytres très longs et très renflés, enveloppants ; deux fossettes basales. Abdomen court, peu visible, le premier tergite toutefois plus long que le deuxième, sans carénules basales, finement rebordé latéralement. Pattes très longues et très grêles. Tout le corps couvert de longs poils très espacés, fins et onduleux sur l'avant-corps, devenant des soies dressées sur les côtés des élytres.

Caractères sexuels portant sur la longueur des articles antennaires.

Edéage (fig. 33) de même type que chez les *Atenisodus* Raffray, mais avec les styles libres, non soudés.

Genre créé pour une espèce d'un noir profond et d'un aspect étrange, mais se plaçant sans aucun doute auprès d'*Atenisodus* Raffray, dont deux espèces sont Indo-Malaises, une autre vit à Formose. L'édéage de l'*A. longicornis* Raffr. (Jeannel, 1952, *Rev. fr. d'Ent.* **19** : 83) est semblable à celui du *Leptorrachis* mais avec trois soies aux styles qui sont soudés.

1. ***Leptorrachis nigra*** sp. n.

(figs. 31 à 33)

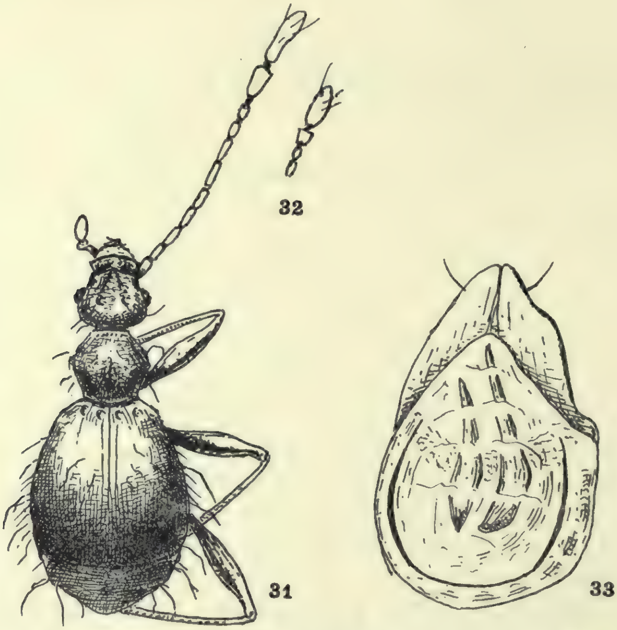
Type : Horton plains (Brit. Mus.).

CEYLAN. Horton plains, alt. 2,000 m. env., 2 mâles et 2 femelles (*G. Lewis*, iii.1892).

Long. 1,4 mm. Ailé. Avant-corps grêle, arrière-corps renflé, les antennes et les pattes très longues. Noir profond, luisant, les antennes et les pattes d'un brun rougeâtre, les palpes testacés. Téguments lisses, la pubescence dressée, très clairsemée. Tête assez grande, le front déprimé, le lobe frontal très réduit, l'épistome largement évasé. Yeux petits et saillants plus courts que les tempes qui sont arrondies. Palpes petits. Antennes très fines. Pronotum hexagonal à disque bossu, la fovéole basale aussi grande que les fossettes latérales. Elytres très convexes, lisses, sans trace de strie discale. Abdomen très court. Pattes très longues, les fémurs postérieurs dépassent amplement le niveau du sommet de l'abdomen.

Mâle. Antennes plus longues, les articles de la massue plus développés (fig. 31). Chez la femelle (fig. 32) les articles 10 et 11 sont notablement plus court.

Edéage (fig. 33) à capsule basale courte, à bord distal anguleux. Styles lamelleux, larges et triangulaires, contigus sur la ligne médiane, avec une soie subapicale externe. Sac interne avec deux grandes dents inégales.



Figs. 31.–33. Gen. *Leptorrachis* nov. Fig. 31. *L. nigra* sp. n., mâle, de Horton Plains, ×30. Fig. 32. Sommet de l'antenne de la femelle. Fig. 33. Edéage, face dorsale, ×240.

Gen. ***RYBAXIS*** Saulcy

Rybaxis Saulcy, 1876, *Spec.* **2** : 136 ; type : *Bryaxis sanguinea* Leach. Jeannel, 1959, *Ann. Mus. Congo Belge*, série in-8⁰, *Zool.* **75** : 513.

1. ***Rybaxis gigantea*** Motschoulsky, 1863

Motschoulsky, 1863, *Bull. Nat. Moscou*, **36** : 422. Type : Mont Patavas (Mus. Paris). Raffray, 1894, *Ann. Soc. ent. Fr.* **62** : 460.

Ceylan. Sommet du Mont Patavas, une femelle (*Motschoulsky*).

Gen. *REICHENBACHELLA* Jeannel

Reichenbachella Jeannel, 1950, *Ann. Mus. Congo Belge*, série in-8°, *Zool.* **2** : 80 ; type : *Reichenbachia punctulata* Raffray. 1959, *Ann. Mus. Congo Belge*, série in-8°, *Zool.* **75** : 521.

1. ***Reichenbachella rufa*** (Schmidt-Goebel, 1836)

(fig. 35)

Schmidt-Goebel, *Beitr. Mon. Pselaph.* : 6 ; type : Ceylan. Raffray, 1891, *Ann. Soc. ent. Fr.* **60** : 486 (pars).

CEYLAN. Wackwele, une vingtaine d'exemplaires (*E. Simon*, 1892).

Raffray a réuni sous le nom de *rufa* (Schm.-Goeb.) toute une série de *Reichenbachia* à carénules basales écartées seulement d'un peu moins du quart du disque du tergite, provenant de Ceylan, du Siam, de l'Annam, de Singapore, de Java, de Célèbes et des iles Philippines. J'ai cité l'espèce de Saïgon (1952, *Rev. fr. d'Ent.* **19** : 87) et je constate aujourd'hui que l'édéage des exemplaires de Saïgon (loc. cit., fig. 24) est bien différent de celui des *R. rufa* typiques, de Ceylan.

Il y aura donc lieu de réviser tous ces *R. rufa* de provenances diverses se trouvant dans la collection Raffray. Pour l'instant je dois constater que le *Reichenbachella* de Saïgon est une espèce différente du véritable *rufa* et je lui donne le nom nouveau de ***R. barbieri*** sp. n.

Le *R. rufa*, de Ceylan, correspond à la variété γ de Raffray (loc. cit., 487), à caractères sexuels très réduits. L'édéage (fig. 35) élargi à la base, a des styles longs et grêles, sinueux et terminés par une petite dilatation transverse ; de plus ces styles portent deux soies externes à la base, alors que les styles du *barbieri* sont achètes.

Gen. *ANASIS* Raffray

Anasis Raffray, 1891, *Ann. Soc. ent. Fr.* **60** : 492 ; type : *Anasis laevicollis* Raffray.

Genre voisin de *Reichenbachia* Leach, dont il ne diffère guère que par la forme de la massette palpaire dilatée en dehors à la base. Trois espèces, l'une à Ceylan, les deux autres à Sumatra et à Manille.

1. ***Anasis singhalensis*** Raffray, 1894

(fig. 34)

Raffray, *Ann. Soc. ent. Fr.* **62** : 459 ; type : Kandy (Mus. Paris).

CEYLAN. Kandy, alt. 600 m. env., 4 femelles (*E. Simon*, 1892) ; 8 exemplaires, mâles et femelles (*I. C. E. Bryant*, vi.1908).

Aspect d'un *Reichenbachia* à carénules basales du premier tergite écartées de plus du tiers de la largeur du disque du tergite.

Pas de différences sexuelles apparentes.

Edéage (fig. 34) à capsule basale arrondie, fortement sclérifiée, en forme d'urne à orifice apical largement ouvert entre deux bourrelets latéraux. Styles représentés par une lamelle courte et bilobée, fortement inclinée du côté ventral, sans soies.

Gen. ***TRISSEMUS*** Jeannel

Trissemus Jeannel, 1949, *Mém. Mus. H. n. Paris,* **29** : 95 ; type : *Bryaxis antennata* Aubé (1833). 1959, *Ann. Mus. Congo Belge,* série in-8°, *Zool.* **75** : 529.

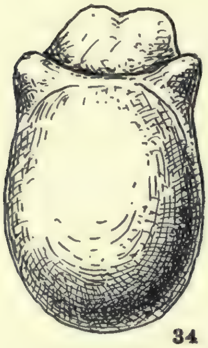
1. ***Trissemus (Trissemites) ceylanicus*** sp. n.

(fig. 36)

Type : Colombo (Brit. Mus.). *schaufussi* Raffray, 1894, *Ann. Soc. ent. Fr.* **62** : 458 (nec Reitter).

CEYLAN. Colombo, un mâle et 3 femelles (*M. Cameron,* xi.1915) ; Kandy, alt. 600 m., un exemplaire (*E. Simon,* 1892).

Long. 1,4 à 1,5 mm. Ailé. Testacé rougeâtre, la pubescence courte et rare. Tête petite, arrondie, plus étroite que le pronotum, le lobe frontal étroit, les yeux peu saillants, plus longs que les tempes qui sont arrondies, effacées. Antennes courtes, les articles 2 à 6 nettement plus longs que larges, les 7 et 8 courts, les 9 et 10 pas plus longs que larges, le 11 trois fois plus long que le 10, la massue peu renflée. Pronotum un peu transverse, convexe et lisse. Elytres un peu moins longs que larges. Premier tergite abdominal avec deux carénules basales espacées du quart de la largeur du disque à la base et un peu divergentes. Pattes courtes.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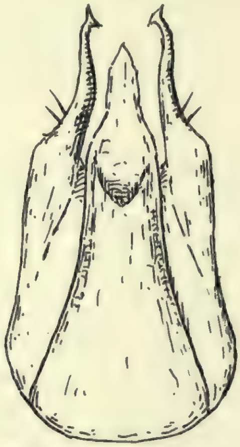
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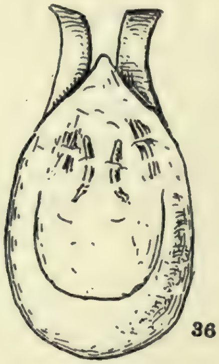
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FIG. 34. Gen. *Anasis* Raffr., édéage de l'*A. singhalensis* Raffr., de Kandy, × 110.

FIG. 35. Gen. *Reichenbachella* Jeann., édéage du *R. rufa* Schm.-Goeb., de Wackwele, × 110.

FIG. 36. Gen. *Trissemus* Jeann., édéage du *T.* (*Trissemites*) *ceylanicus* sp. n., de Colombo, × 110.

Tibias intermédiaires avec une dent apicale interne chez le mâle.

Edéage (fig. 36) à capsule basale ovale, renflée, membraneuse et deux styles écartés l'un de l'autre, incurvés et tronqués au sommet. Sac interne avec une paire de dents petites et flanquées en dehors pas des paquets d'épines.

Espèce voisine de *schaufussi* Reitt., de Singapore, et appartenant à un groupe d'espèces répandu dans l'Inde.

Subfam. PSELAPHITAE s. str.

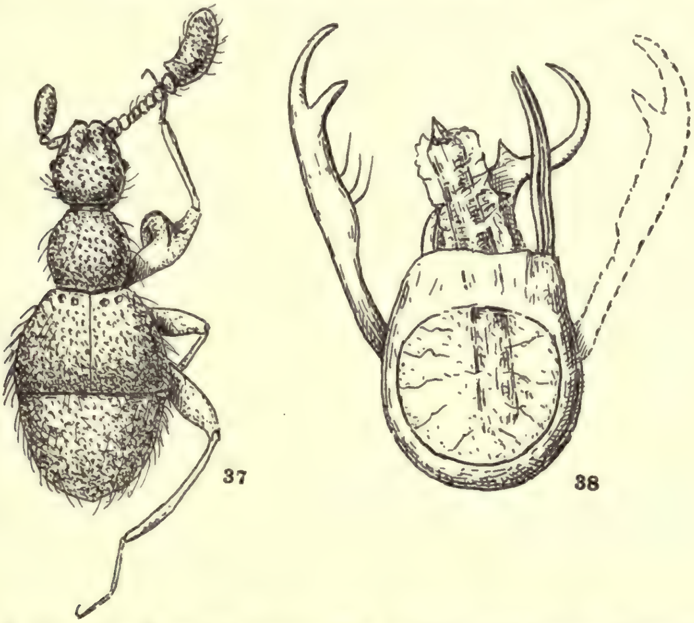
Trib. CYATHIGERINI Raffray

Gen. ***MANULEIGER*** nov.

Type : *Manuleiger remyi* sp. n.

Genre bien différent des autres genres de la tribu qui sont tous d'un type très constant. Alors que chez ces derniers les mâles ont le dernier articles des antennes excavé en coquille, chez *Manuleiger* la coquille est portée sur les fémurs antérieurs.

Très densement ponctué. Tête ayant la structure habituelle des Cyathigerini, le front convexe, à lobe frontal saillant, la face inférieure du crâne largement excavée. Palpes anormalement grands, la massette allongée, à extrémité mousse. Antennes de 9 articles, alors qu'elles n'ont que 7 articles chez les autres genres de la tribu, le scape court, le dernier article très gros, mais non transverse. Pronotum globuleux, sans fovéole basale ni fossettes. Elytres courts et convexes, deux fossettes basales. Abdomen à segments entièrement soudés, sauf les deux derniers. Il se présente comme une boîte close et rigide, convexe dorsalement, concave ventralement, avec un orifice anogénital arrondi, recouvert par le pygidium. Hanches postérieures bien séparées, les intermédiaires et les postérieures peu allongées, comme chez les autres Cyathigerini. Un seul ongle.



FIGS. 37 et 38. Gen. *Manuleiger* nov. Fig. 37. *M. remyi* sp. n., mâle, de Nuwara Eliya, ×34. Fig. 38. Edéage du même, face dorsale, ×185.

Fémurs antérieurs (fig. 37) avec une haute saillie transverse, arrondie et excavée, qui est bien probablement un caractère sexuel mâle.

Edéage (fig. 38) à capsule basale courte et arrondie, avec les pièces distales asymétriques et deux très grands styles articulés et sétifères. Sac interne chitinisé.

1. *Manuleiger remyi* sp. n.

(figs. 37 et 38)

Type : Nuwara Eliya (Mus. Paris).

Ceylan. Nuwara Eliya, ravin dans Elephant estate, alt. 2,300 m. env., un mâle (*P. Rémy*, 21.viii.1959).

Long. 1,4 mm. Rougeâtre, densement et fortement ponctué, la pubescence longue et dense. Tête déliée, à front bombé et lobe frontal saillant et bilobé. Yeux petits, situés à la partie postérieure d'une lame évasée formée par l'épistome. Antennes épaisses, le scape et le pédicelle courts, les articles 3 et 4 petits, les 5 à 8 transverses et plus épais que le scape, le 9 enfin incurvé, épais et mousse, à base tronquée. Pronotum à peu près aussi long que large. Elytres courts, moins longs que larges au sommet. Abdomen un peu plus long que les élytres. Pattes assez longues.

Edéage (fig. 38) à capsule basale prolongée par un manchon assez court, dont le bord gauche porte une paire de très grandes soies et la face ventrale se prolonge en une lame distale asymétrique, large à la base, mais effilée en pointe inclinée à gauche puis redressée, avec une dent sur son bord droit ; en dessous, la base de la lame distale est doublée d'une forte dent transverse. Styles très longs, mobiles, avec deux dents apicales et trois soies sur la face interne. Articulés à la base, ces styles sont très fragiles, et l'un d'eux à été perdu.

Sac interne chitinisé sur toute sa longueur.

Femelle inconnue.

Trib. PSELAPHINI Raffray

Gen. ***PSELAPHAULAX*** Reitter

Pselaphaulax Reitter, 1909, *Fn. Germ. Käf.* **2** : 217 ; type : *Pselaphus dresdensis* Herbst (1792). Jeannel, 1959, *Ann. Mus. Congo Belge*, série in-8°, *Zool.* **75** : 593.

1. ***Pselaphaulax*** (s. str.) ***ceylanicus*** sp. n.

Type : Colombo (Brit. Mus.).

Ceylan. Colombo, deux exemplaires (*Dr. M. Cameron*, xi.1915).

Long. 2 mm. Ailé. Brun rougeâtre, déprimé, la pubescence courte et rare. Tête courte, le front large entre les yeux, la partie préoculaire plus courte que le reste de la tête, aplanie, sans sillon longitudinal sauf tout à fait en avant, entre les tubercules antennaires ; yeux très grands, deux fois plus longs que les tempes ; pas de bosse occipitale. Dessous de la tête avec un amas villeux sous les yeux. Palpes longs et grêles, le renflement distal de la massette lisse, un peu moins long que son funicule. Antennes à scape à peine deux fois aussi long que large, les articles 3 à 10 tous un peu plus longs que larges. Pronotum aussi long que large, convexe. Elytres deux fois plus longs que le pronotum, la strie discale écourtée, la base convexe sans carènes. Plaque tergale large et déprimée, deux fois aussi large que longue. Pattes courtes et robustes.

Edéage épais, la capsule basale avec une calotte distale arrondie, flanquée de deux apophyses terminées en pointes incurvées en dehors. Styles très grêles, membraneux.

Gen. ***PSELAPHIDIUS*** Jeannel

Pselaphidius Jeannel, 1951, *Rev. fr. d'Ent.* **18** : 9 ; type : *Pselaphus filipalpis* Reitter (1882). 1959, *Ann. Mus. Congo Belge*, série in-8⁰, *Zool.* **75** : 597.

1. ***Pselaphidius latifrons*** (Raffray, 1909)

Raffray, *Ann. Soc. ent. Fr.* **78** : 41 (*Pselaphus*) ; type : Kandy (Mus. Paris).

Ceylan. Kandy, alt. 600 m. env., une femelle (Coll. Raffray).

Remarquable par la forme des palpes, dont le renflement distal de la massette, particulièrement grand, est un peu plus long que son funicule. Espèce à pattes courtes.

2. ***Pselaphidius laevicollis*** (Reitter, 1883)

Reitter, *Verh. zool.-bot. Ges. Wien*, **23** : 410 (*Pselaphus*) ; type : Ceylan (Mus. Paris).

Ceylan, 2 exemplaires (Coll. Raffray).

Trib. CTENISTINI Raffray

Gen. ***CTENISTES*** Reichenbach

Ctenistes Reichenbach, 1816, *Mon. Psel.* : 75 ; type : *Ctenistes palpalis* Reichenbach. Jeannel, 1956, *Mém. Mus., Zool.* **14** : 168.

Subgen. ***Tecnesites*** nov.

Type : *Ctenistes* (*Tecnesites*) *ceylanicus* sp. n.

Le sous-genre *Tecnesis* Peyer. a été créé pour des espèces sahariennes de grande taille, dont le pédoncule palpaire n'est pas pénicillé. Le même caractère se retrouve chez l'espèce suivante, de Ceylan, mais celle-ci présente un développement inusité de l'intermédiaire palpaire qui la distingue nettement des *Tecnesis*.

1. ***Ctenistes (Tecnesites) ceylanicus*** sp. n.

(figs. 39 à 41)

Type : Dikoya (Brit. Mus.).

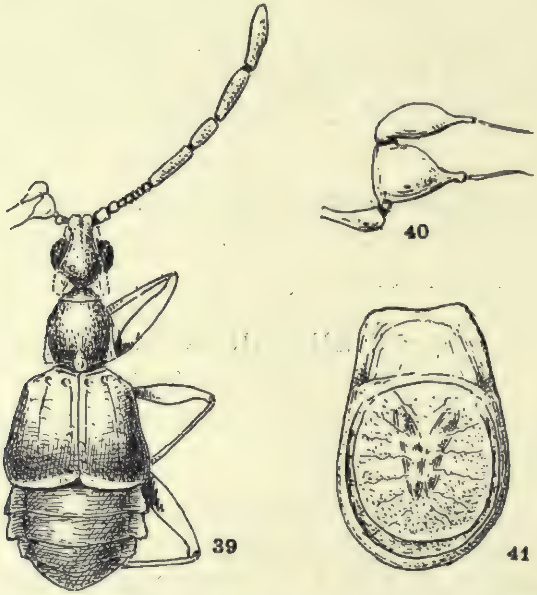
Ceylan. Dikoya, alt. 1,300 m. env., mâle et femelle (*G. Lewis*, ii.1882).

Long. 2 mm. Ailé. Testacé rougeâtre. Tête courte, le lobe frontal relativement court, la partie postoculaire du front élargie, convexe, les yeux très grands. Palpes maxillaires (fig. 40) à pédoncule sans pénicille, l'intermédiaire et la massette très dissemblables, tous deux pénicillés. Pronotum aussi long que large, avec trois paquets villeux à la base. Elytres courts et amples, à épaules anguleuses et saillantes, le bord apical avec une grande frange membraneuse blanchâtre. Abdomen court et large. Pattes grêles.

Mâle. Antennes longues, à funicule plus court que l'article 8, l'article 3 un peu plus long que les 4 à 7 qui sont moins longs que larges. Article 8 six fois, 9 trois fois et demie, 10 et 11 quatre fois aussi longs que larges.

Femelle. Antennes plus courtes, les articles 3 à 6 une fois et demie aussi longs que larges, 7 un peu plus de deux fois, 8 globuleux et court, mais un peu plus épais que le 7 ; articles 9 et 10 épais et tronconiques, un peu plus longs que larges, le 11 pas tout à fait deux fois aussi long que le 10.

Edéage (fig. 41) du type habituel, avec deux pièces chitineuses dans le sac interne. Pas de styles.



Figs. 39–41. Gen. *Ctenistes* Redt. Fig. 39. *C.* (*Tecnesites*) *ceylanicus* sp. n., mâle, de Dikoya, × 22. Fig. 40. Palpe maxillaire droit. Fig. 41. Edéage, × 120.

Gen. ***PORODERUS*** Sharp

Poroderus Sharp, 1883, *Trans. ent. Soc. Lond.* : 294 ; type : *Poroderus armatus* Sharp (Japon). Jeannel, 1956, *Mém. Mus., Zool.* **18** : 114.

Genre avec plusieurs espèces au Japon, une au Siam et une à Sumatra. Raffray lui a rattaché la suivante.

1. ***Poroderus angusticeps*** (Schaufuss, 1887)

L. W. Schaufuss, *Berl. ent. Zs.* **31** : 289 (*Enoptostomus*) ; type : Ceylan.

Je n'ai pas vu cette espèce qui fait défaut dans la collection Raffray.

Trib. TMESIPHORINI Jeannel

Gen. *TMESIPHORUS* Leconte

Tmesiphorus Leconte, 1850, *Boston J. Nat. Hist.* **6** : 75 ; type : *Tmesiphorus carinatus* Leconte (Amérique du Nord). Jeannel, 1956, *Mém. Mus., Zool.* **18** : 118.

1. *Tmesiphorus laevis* sp. n.

(fig. 42)

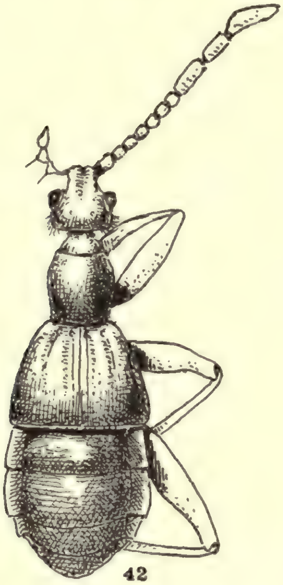


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Fig. 42. Gen. *Tmesiphorus* Lec., *T. laevis* n. sp., femelle de Ceylan, × 18.

Type : Ceylan (Brit. Mus.).

Ceylan. L'unique exemplaire connu porte la mention " Bowring 63-47 ".

Long. 3 mm. Noir de poix, les élytres, les antennes et les pattes rougeâtres foncés. Grêle et allongé, le tégument absolument lisse et glabre. Tête à front convexe, sans profondes dépressions ni carènes, le lobe frontal petit et sillonné ; yeux plus courts que les tempes qui portent quelques soies mais n'ont aucune trace d'épines sous-oculaire. Cou très délié. Palpes maxillaires comme chez les autres *Tmesiphorus*, le pédoncule et l'intermédiaire pénicillés, la massette légèrement lobée latéralement. Antennes robustes, la massue de trois articles, tous trois, trois fois plus longs que larges. Pronotum plus long que large sans fossettes ni fovéole basale. Elytres à peu près aussi longs que larges, étroits à la base, deux fossettes basales, la suture et les stries discales enfoncées dans la partie basale. Abdomen avec les tergites unis et convexes, sans la moindre trace de carènes. Pattes très longues.

Mâle inconnu.

Curieuse espèce qui devra peut-être devenir le type d'un genre nouveau lorsque le mâle sera connu.

Gen. *SYNTECTODES* Reitter

Syntectodes Reitter, 1882, *Verh. naturf. Ver. Brünn,* **20** : 185 ; type : *Sintectodes diversipalpus* Reitter.

Genre différent surtout de *Tmesiphorus* par l'absence de pénicilles sur les articles des palpes. Il est spécial à Ceylan.

1. ***Syntectodes diversipalpus*** Reitter, 1885

Reitter, *D. ent. Zs.* **29** : 333 ; type : Ceylan (Mus. Paris).

Ceylan. Kandy, alt. 600 m. env., un exemplaire (*G. Lewis*, xi.82) ; Galle, niveau de la mer, un exemplaire (*G. Lewis*, xii.81) ; Nuwara Eliya, 2,200 m. env., un exemplaire (*E. Simon*, 1892).

Le dernier article des palpes est simple.

Obs. Le *S. crassus* Schaufuss (1887, *Berl. ent. Zs.* **3** : 296) est sans doute identique au *S. diversipalpus* (Raffray, 1894 loc. cit. : 461).

2. ***Syntectodes fortipalpus*** Raffray, 1901

Raffray, *Ann. Soc. ent. Fr.* **70** : 28 ; type : Anuradhapura (Mus. Paris).

Ceylan. Anuradhapura, 2 exemplaires (*E. Simon*, 1892).

Le dernier article des palpes est contourné.

Trib. TYRINI Raffray

Gen. *CENTROPHTHALMUS* Schmidt-Goebel

Centrophthalmus Schmidt-Goebel, 1838, *Beitr. Mon. Psel.* : 7 ; type : *Centrophthalmus paria* Schmidt-Goebel. Jeannel, 1949, *Mém. Mus. Zool.* **29** : 209.

1. ***Centrophthalmus clementis*** Schaufuss, 1877

L. W. Schaufuss, *Psel. Siams* : 20 ; type : Bangkok (Mus. Paris). *forticornis* Schaufuss, 1877, loc. cit. : 21 ; type : Bangkok (Mus. Paris).

Ceylan. Kandy, alt. 600 m. env., un mâle et 3 femelles (*G. Lewis* ii.1882).

Le *forticornis* est le mâle, le *clementis* est la femelle. L'espèce n'était connue que du Siam et de la Cochinchine.

Gen. *PSELAPHODES* Westwood

Pselaphodes Westwood, 1870, *Trans. ent. Soc. Lond.* **2** : 129 ; type : *Pselaphodes villosulus* Westwood.

1. ***Pselaphodes limoni*** Raffray, 1894

Raffray, *Ann. Soc. ent. Fr.* **62** : 462 ; type : Cottawa (Mus. Paris).

Ceylan. Cottawa, une femelle (*E. Simon*, 1892).

Gen. *TYRODES* Raffray

Tyrodes Raffray, 1908, *Gen. Ins. Psel.* : 379 ; type : *Tyrus histrio* Schauf. Jeannel, 1957, *Rev. fr. d'Ent.* **26** : 31.

Trois espèces connues : *clavatus* Raffr. de Singapore, *setosus* Jeann. du Tonkin et la suivante :

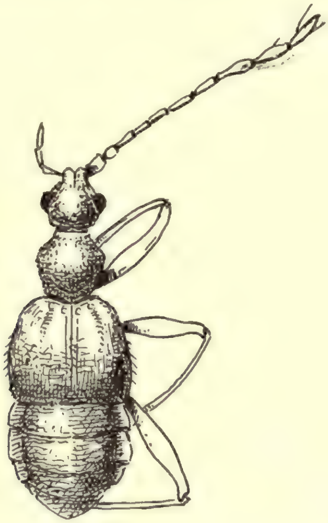
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FIG. 43. Gen. *Subulipalpus* Schauf., *S. spinicoxis* Schauf., femelle de Ceylan, × 20.

1. *Tyrodes histrio* (L. W. Schaufuss, 1887)

Tyrus histrio Schaufuss, 1887, *Berl. ent. Zs.* **31** : 297 ; type : Ide (Mus. Paris). Jeannel, 1957, loc. cit., fig. 29.

CEYLAN. Nuwara Eliya, alt. 2,200 m. env., 2 femelles (*E. Simon*, 1892) ; Dikoya, alt. 1,300 m. env., mâle et femelle (*G. Lewis*, vii.1882).

Gen. *SUBULIPALPUS* L. W. Schaufuss

Subulipalpus Schaufuss, 1877, *Psel. Siams* : 23 ; type : *Subulipalpus spinicoxis* Schaufuss. Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 365.

1. *Subulipalpus spinicoxis* L. W. Schaufuss, 1877

(fig. 43)

Schaufuss, loc. cit. : 23 ; type : Bangkok (Mus. Paris).

CEYLAN. Une femelle étiquetée " Thwaites, 67–25 " (Brit. Mus.).

Très voisin du *myrmecophilus* Raffr. de Hong-Kong. Il ne diffère guère que par la bosse discale du pronotum plus saillante.

Décrit du Siam, le *S. spinicoxis* se retrouve à Ceylan, tout à fait semblable au type.

Gen. ***HORNIELLA*** Raffray

Horniella Raffray, 1904, *Ann. Soc. ent. Fr.* **73** : 369 ; type : *Hornia hirtella* Raffray. *Hornia* Raffray, 1901, *Ann. Soc. ent. Fr.* **70** : 29.

1. ***Horniella hirtella*** (Raffray, 1901)

Raffray, loc. cit. : 30 (*Hornia*) ; type : Banderawella (Mus. Paris).

CEYLAN. Banderawella, un exemplaire (*W. Horn*).

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